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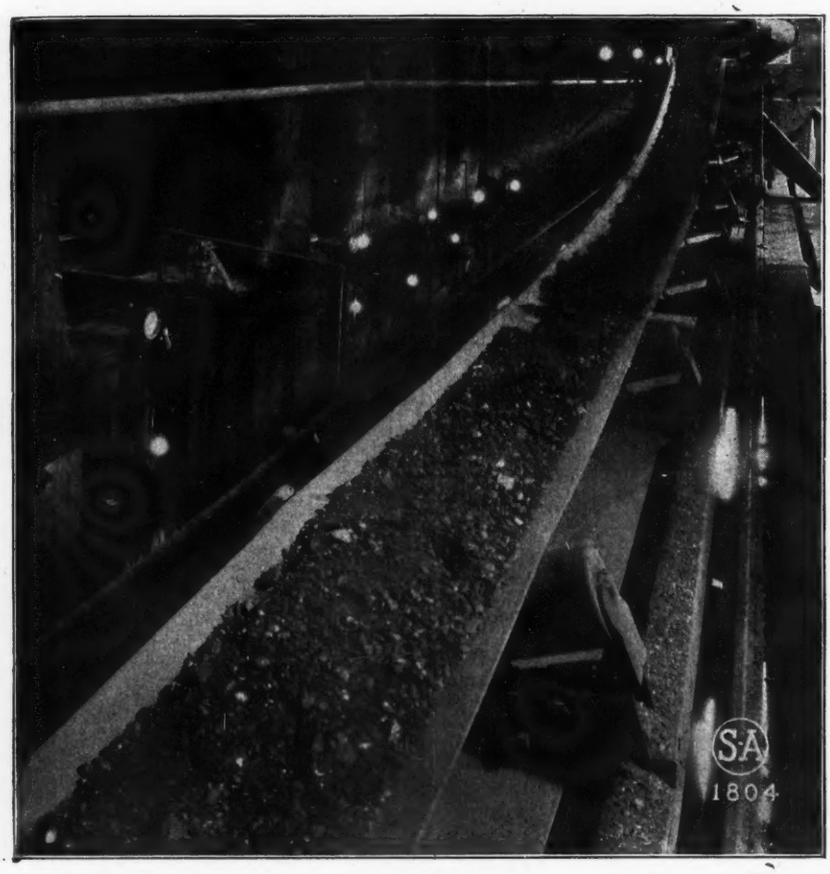

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The Gospel of Manual Work

A CORRESPONDENT from Japan charges the Japanese engineers with having a training that is entirely mental, and one in which the manual experience which we in America regard as necessary and complementary is omitted. If this is true, it means that Japan is following out the European handicap, instead of conforming to the practice which has put the United States foremost in engineering and industry—the good old gospel of the two-fisted.

The development of the human hand by evolution has enabled man—otherwise a clumsy animal—to perform an infinite variety of work, and so eventually to shape all nature to his uses. Mental culture followed manual accomplishment, and this relation is so deeply ingrained that education will always be best accomplished along these lines. For this reason, American education, and specifically American mining engineers, have always found that the best engineers were produced from those who began with manual education and kept it up while their mental development was proceeding.

If we want to teach a student a principle of chemistry, an experiment which he performs himself will accomplish at once what repeated memorizing of results obtained by some one else's manipulation will never achieve. The student of agriculture who reads agricultural books exclusively, without putting his hand to the plow and the pruning knife, is, as is well known, wasting his time. If we must choose between the exclusive education through practice and that exclusively through study, we shall always wisely choose the former—hence the general respect in which the "practical" man is held.

There is something deeper than efficiency in this. The sulks of the old world are based upon the friction between these two classes—that consisting of the knights of the horny palm, too often ignorant and improperly developed mentally, and the lily-white palms of the class who are seeking to stultify their heritage by avoiding contact between their hands and the world. In the United States, the general high standard of education makes it the rule rather than the exception that the man who specializes in his hands is as well educated and fundamentally as well poised as the great clerical or white-collar class, who labor mainly with their brains. It also is common that the latter class are quite competent manually, and have passed through an excellent course in the use of their muscles.

The American idea, is, therefore, for an engineer to have personally become competent in the manual work which he has to direct, and be able to take the place of any man under him and show him how his work is to be done. Thereby he incidentally earns the subordinate's respect and loyalty, instead of his antagonism.

Manhood respects manhood. How many of our mining engineers have been trained in the manual craft of mining? We believe that the large majority will qualify. At any rate, it is our universal creed; and we recommend it to Europe and Japan, as not only a technical and an industrial, but a sociological remedy. Thus, we shall become leader and follower—which is an arrangement bred in the heart of human nature—rather than capital and labor. Many of those who in this country, fed full and daft with Old-World ideas, seek to rouse "labor" against the citizen in general, are themselves of the lily-fingered Old-World variety and unacquainted with that healthy manual craft and exercise which go to make the best type of man!

"Passing the Buck"

THERE is in a Western city a sign which has attracted our attention and which made a sufficient impression at the time to be readily recalled. It is:

> Try Murphy's famous drink!
> With beans, roll and frankfurter.
> All for 10c.

An economic lesson is back of the placard and its commercial fulfillment. The individual making this liberal plea to the wayfarer had to made a readjustment in his affairs when prohibition swept the country. Murphy did not strike. Murphy did not starve himself to death. On the contrary, he figured out an acceptable ration; cut his profit to a narrow margin; had his placard painted by some hungry sign painter, no doubt, and went out for business.

Though we don't know Murphy we like his courage and applaud his ingenuity. In sharp contrast is the attitude of some mine workers. A case in point is the strike which is now on at Virginia City, Nev. On Sept. 5, the miners, disregarding their agreements to give the operators the customary thirty days' notice, walked out and signified their willingness to walk back if the ruling wage was increased $1 per day. The operators pointed out their inability to meet this increase, owing to the fact that the properties under their control were not making expenses or were in the preliminary stages of development. They offered to meet the men more than half way. One company offered the men employment on a contract basis which proved sufficiently acceptable to some of the miners to cause them to return to work. The Gold Hill Miners' Union promptly interfered, and work stopped. The operators also, as a group, offered the miners a substantial reduction in living costs by giving them the privilege of buying any of the commodities carried in stock at their general merchandise store at a price 20 per cent below present wholesale prices and thus bring living costs to the level existing in 1919. At latest accounts this has not proved acceptable. In fact, it was indignantly spurned.

Every one has suffered from the high cost of living. "Passing the buck" has been resorted to until the "buck" has been worn out. The Virginia City and Gold Hill miners have passed the "buck" onto the operators in expectation that the operators would pass said buck on to the stockholders. We are glad that the operators in

question, with one exception, refused to go to their stockholders for further increases.

The situation has its critical phases. The stockholders, unless they are different from other men, will not go on indefinitely putting their money into unprofitable enterprises. Operation on the Comstock is dependent upon excellent management and economical operation. At best the profit margins are low, and unless active co-operation is secured from the workers the operations cannot be successful.

We feel that if the workers would attack their own difficulties in the same spirit as the individual whom we have quoted in the beginning of this editorial, there would be measurably less difficulty and more opportunity for work. After all, opportunity for work is one of the greatest blessings that comes to mankind. Anything that destroys that opportunity will eventually reduce the prosperity of a community.

"Passing the buck" has not brought a solution of our economic problem. It will not solve the problem for the miners of the Comstock. Only the spirit of active co-operation and the desire to make individual readjustment can do this.

Bolshevism at Home and Abroad

THE Red Terror at the moment is the most important question on Earth; and, therefore, the one that we first have to consider in looking ahead for business and making our plans for mining. We must look at events dispassionately, and neither tilt back in our rocking chairs in a fool's fancied security, nor be stampeded by a few despicable terrorists. Will our governments and our existing social and financial systems be overthrown? It seemed unbelievable for Russia, yet the thing is done. Italian workmen recently confiscated industrial plants on a wholesale scale, held them uncontested, and only delivered them back for a substantial consideration. In England, the labor organizations frankly support the Russian Reds, and are exerting themselves, with considerable success, to align England with the Bolshevists, through the pussy-footing policy of Lloyd George.

What of the United States? It is our opinion that the danger is past; that the test came last year when the various strikes were declared, to paralyze industry, and failed. American organized labor considered attentively the Red Dragon which had crept into its councils, and cast it out wholeheartedly. Greater intelligence and more widespread education achieved their victory, and common sense took secure possession of workman, farmer, and merchant. If some of us criticise at times some of the attitudes of organized labor, let us not forget to be grateful that it stood between the liberty of our country and the radical, and really made America "safe for democracy." Laying prejudice aside, it would be hard to find a more trenchant and intelligent verdict as to Bolshevism than that repeatedly delivered by American "labor":

"We are living in the Republic of the United States of America, a country by no means perfect, in which, all too frequently, injustice is done. But it is a republic based upon the principles of freedom, justice, and universal suffrage. Our men and women are not likely to throw these rights and principles into the scrap heap for the dictatorship of Moscow's Lenine and Trotzky."

Who shall deny the writer or writers of a proclamation like this a place among American statesmen? There is no ruffling of the surface by details like the anarchistic expulsion of the Socialistic members from the New York Legislature, for it is known and understood that those violators of constitutional freedom who committed the expulsion have been adequately condemned by American public opinion. So much for the safety of the United States then, and radical plotters may set off their bombs and commit their sporadic crimes without long getting even the attention of the respectable citizen.

We note, however, that these insensate doctrines and wild acts are more likely to appeal to the ignorant. The few plotters in our country are largely foreigners, and in countries where the masses are ignorant this get-rich-quick scheme of Lenine's gathers in millions of suckers. Accordingly, we note also the relative success among the Italian and the British workmen, and the failure to make much impression in the Scandinavian countries, Germany, Holland, Belgium and France.

We of the mining profession will, therefore, do well, while concluding that the United States and Canada are fundamentally sound, to consider Mexico, where the years of revolution have not eliminated the difficulties, where the mass of the population is ignorant and foot loose, and where a throttling agrarian system not dissimilar to that existing under Imperial Russia still offers a problem that none of the temporary governments have dared to attack. Lenine's propagandists and spies, working under disadvantage in the United States, have easier sledding in Mexico. Already, we understand, the province of Yucatan is in the hands of the Communists; and they revelled in incendiary public speeches the other day in Mexico City and hoisted the Communist flag without being disturbed. Among the practical suggestions offered by the orators were the construction of barricades in the streets, the sacking of food shops, and the dynamiting of the Archbishop's palace. Truly, when you cross a Russian Bolshevist with a Mexican, you get a fearsome hybrid, a sort of hippopotato.

Another suggestion, to which we are totally opposed, was the erection in the Central Plaza of a guillotine for all journalists. As a mark of our disapproval, we shall postpone the tour of investigation of Mexico which we had planned. Surely, dear Brotherhood, not *all* journalists? There are some we could mention that it might not hurt to guillotine—we doubt if they would realize it anyhow—but there are others of finer mould who are sensitive to a thing like that. And consider the inefficiency—a whole guillotine for half a dozen measly journalists—surely an extravagance; but if you would chop up the guillotine into safety razors it would go much further, and the beneficial effects might be more universal.

Art in Mine-Building Construction

SINCE the inception of mining, the primary thought of the mine operator has been the winning of the ore from the earth. He has followed, in most cases, a well-thought-out plan whereby the margin of profit would be such as to compensate for the effort; he has enlarged upon his scale of operations as the conditions permitted, and in general pursued the course adopted by those engaging in any line of industry.

Consider for the moment the case of a successful operator, a company which has reached a point where its continuance is assured and the policies that have been followed are such that no unsurmountable handicaps stand in the way of advancement. The employees receive broad and liberal treatment, the plants and methods represent the most modern ideas, and the entire organization is a credit to the originators and to the

community. Such a concern exerts a potent influence on other mining companics, and the latter, to a considerable extent, must conform in their ideals to those already established by their contemporary.

For many years little thought was given by mine operators to anything but the business of mining—of getting out the ore, of preparing it for treatment and for the market. Methods were studied and advances in practice were made, and the business was judged purely from the standpoint of mechanical production. Later came the development of an idea which at first appealed to some as being too "élite" for such a vigorous pursuit as mining. "Human engineering," we have pleased to call it, and although the term is somewhat general, it is now fairly well understood and covers a vast amount of work which is being done by all progressive mining companies. The benefits of such welfare work cannot be computed on a dollars-and-cents basis, but that it is a paying proposition is admitted, and further proof is clearly shown by the fact that the movement is growing.

Under this general head comes the construction and improvement of mine buildings with a view to their greater utility and economy. Shall we not go further and include beauty? The artistic mission architecture at Ajo, Ariz., is a convincing example of the utility of beauty; likewise the Cliffs shafthouse at Ishpeming, Mich., and the Quincy hoist house in the copper country. Certainly, if a building is a makeshift or an eyesore, the structure offends us and does not add to our sense of well-being; therefore, a well-planned design can be considered as a part of the general welfare work.

Permanent mine-plant construction requires stability, but does this imply ugliness? How frequently we notice at mine plants that the buildings are solidly constructed, but with absolutely no thought given to general appearance. Need this be so? We are told that stresses, strains, and other functions of the walls and roof eliminate any possibility of securing an artistic effect. But we don't believe it, and one has only to look about in many of the mining districts today to see that the old order is changing and an attempt is being made to discard the earlier types of engine and shafthouses and other mine buildings, and to adopt those designs which are pleasing to the eye. Such ideas are characteristic of the successful company—the builders of standards and those who exert influence.

Who Suffers from Increased Freight Rates?

WHEN you make a big strike or a new hoisting metal sellers, particularly in the East, were kept busy determining just how much the advances would amount to per pound of metal sold. It was rightly pointed out that the changed rates would affect not only delivery charges, which in the case of copper, are paid by the seller, but also would make it more expensive to bring the unrefined metals East, and would increase the cost of materials and equipment necessary to smelt the ores. The total extra cost was of course almost impossible to estimate but it was variously figured at from one-half to one cent per pound of metal sold. Selling agencies considered it no more than right that consumers should stand this expense. This, however, was not to be. Had any producers added even half a cent to their previous prices for copper, for example, they would not have sold a pound. Lead also, owing to importations from Europe, had begun to show an easier tendency before the freight rates took effect. In a buyer's market small possibility existed of marking up prices to offset increased costs no matter how definite or how plausible the reason may have been.

The only alternative, if the smelting and refining companies were not to suffer the loss, was to charge the ore producers more for smelting; or what amounts to the same thing, deduct a certain sum from the quoted price of metals on which settlements are made. This is what has been done by some of the companies. One quarter of a cent is being deducted from the quoted price of lead and copper and one cent from the price of silver. This may or may not be an equitable figure; at any rate it will help to recompense the smelting companies for the increased charges, which, by the way, should be more than offset at no distant date, by the improvement in transportation service which should result.

There remains the poor producer with no one on whom to pass the advance. He cannot say to the miner, "I get less for my concentrates, so you will get 50c. less a day." If he did, the ore would not be mined. As a result of the decreased profits rumors of shutdowns are prevalent, for many small producers were running close to the line. We would urge, however, that the small producer take heart. Prices in many lines are definitely falling and it is almost certain that it will cost him gradually less to operate. His products, however, are not likely to decrease in value, with the possible exception of lead. If he can break even this fall, or can afford to lose a little, it will pay him, we think, to carry on.

Just as You Write to Bill

WHEN you make a big strike or a new hoisting record you enjoy sitting down and writing friend Bill about it. No stilted style nor long letter is required. You simply put down the plain facts in every-day language that Bill will understand. Under the same circumstances, why not do the same thing with those thousands of other engineers who are interested in you and your work and with whom you should be constantly in touch for mutual assistance? New technical developments, minor improvements in method, little devices that mean large savings—all should soon become the property of the profession as a whole, that by mutual helpfulness the entire industry may profit.

You can write about these things just as you would in a letter to your best friend. There is no need of formal style nor literary elegance. Perhaps the most valuable report will be the one which least resembles the classical literature of the essayist.

What your friends want is a clear, simple, and, above all, short description of what you did and why; what you accomplished and what it will save, in either money, time or inconvenience. If you will bear in mind your duty thus to pass on your achievements, you can count upon your fellow-workers to do their share for you in return.

E. & M. J. Index

THE INDEX for Vol. 109 of the *Engineering and Mining Journal* is now ready for distribution and will be mailed only to those who request it. Those who wish a copy of the Index, are requested to send for it promptly. A postcard will do.

WHAT OTHERS THINK

Anarchy in Siberia

As an American mining engineer and constant reader of the *Engineering and Mining Journal* and, moreover, as an engineer of long and intimate experience in Siberia, I feel it my duty to write you this letter on the subject of Bolshevist propaganda. Please accept my assurance that I am writing in no captious spirit, and that I am animated only by the desire that a leading professional publication should not be misled on a vital subject, and thereby, through its authoritative position, mislead its readers.

In your issue of Aug. 14, 1920, you publish a contribution headed "The Mining Opportunities in Siberia Under the Present Régime of Zemstvo-Soviet Government." The article purports to come from the pen of "Ivan Narodny," which, when faithfully rendered into the English language, is "John the Communist," and no more a typical Russian name than "Jack the Ripper" is a typical American name. The article from beginning to end appears to be purely Bolshevik propaganda, and is replete with misinformation, to use no stronger term.

The aim of the article in question is plain. It is an attempt to utilize American abhorrence of the worst features of the Czarist régime to claim for the "Zemstvo-Soviet Government" credit for all the constructive work of the Czar's government, which I can assure you was the only construction work ever done in Russia as it exists. As a matter of fact, there is in Siberia today no government save the few commissars controlling the railway centers. The peasants are in sporadic revolt. It would be easy to refute in detail the statements of "Ivan Narodny," but a few examples will suffice. He states:

"The local co-operative societies had already started the establishment of tanneries, canneries, soap factories, and flour mills."

The truth is that such institutions, both co-operative and private enterprises, have been in existence for decades. He also says:

"The butter produced in the Omsk, Semipalatinsk, and Tobolsk regions only would be twice as much as that of the United States."

The truth is that in 1913, the year of largest output, the whole of Siberia produced 90,000 tons of butter, or 2 lb. per year for each inhabitant of the United States. "Narodny" says, further:

"At many places we can give mines and mills which were operated by the past régime or its favorites. . . . But we will not tolerate criminal exploitation as used to be, or corruption and all the methods of an autocratic government."

I personally know of no "criminal exploitation" nor "corruption" in mining operation in the past, but presume that "Ivan Narodny," as a Communist, believes that all exploitation by private capital is of a criminal nature. By a curious contradiction, however, he makes it plain in the first sentence of this quotation that the alleged opportunities for the investment of foreign capital in Siberia are to be largely provided by property which has been stolen from other foreigners who had courage to try to develop Siberia's resources in the past.

I personally know of such foreign property worth considerably over $100,000,000 and belonging to many thousands of small investors in foreign countries which has been forcibly confiscated, or, to use the Bolshevik term, "nationalized." Although "nationalized," none of these properties are working. The morality of utilizing a theft from one set of foreign investors as a bait for soliciting capital from other foreign investors appears to be as dubious as the failure of such a policy will be certain when once the truth concerning present contentions is made known.

Without going further into details, I would again point out that the *Engineering and Mining Journal* has apparently been made the unwitting instrument of a cunning attempt at mendacious Bolshevik propaganda. I especially regret this at a time like the present when the so-called government of "Ivan Narodny" holds as prisoners many American and other foreign mining engineers and refuses to release them. The facts as to these engineers are known to the Department of State in Washington. Y.

Boston, Sept. 29, 1920.

The "Human Engineering" Number

I wish to congratulate your people in getting out such an issue as you did get out on such a hopelessly inexact and inscientific a thing as "Human Engineering." Psychology is a thing that every newspaper man learns with the ABC's of his business—only he probably would not recognize it as such. And your "human engineering" is, after all, nothing in the world but applied psychology. If the employer of men would only take as good care of the human machinery that is producing his dividends as he does of his lathes and punches and laboratory equipment, he wouldn't have any strikes on his hands. But by "taking as good care of his human machinery" I don't mean handing out a lot of gifts, liberally exuding hot air or "giving" people libraries, gymnasiums, "sanitary homes," and such gratuitous benefits. The proper sort of an upstanding man does not want a whole lot of things "given" to him by someone else.

You know, of course, that Shakespeare is commercially impossible in the theatre. You also know, of course, that Shakespeare wrote the most appealing and most human plays that have ever been written in the English language. Now, why is it that these plays are impossible commercially? Because they have been torn, twisted, dissected and macerated by high school and college professors and students to a point where the average man or woman who has been to school goes out into life weary of Shakespeare and all his works.

I was tickled to death to see such a wide departure from exact science as "Human Engineering" have a place in your magazine. Do it again. That publication is actually becoming one of the most interesting I read.

Chicago, Ill. HUMANIST.

Mineral Wealth of the Kingdom of Jugoslavia

Deposits Worked Since Neolithic Age—Region Is Rich in Base Metals and Has Gold, Silver, And Coal—Repressive Policy of Central Powers Long Held in Bondage The Nations Comprising the New State

BY CAPTAIN GORDON GORDON-SMITH*
Written for *Engineering and Mining Journal*

ONE of the results of the World War has been the creation of a number of new states, the names of which sound unfamiliar to American ears. One of these is Jugoslavia, or, to give it its official title, the Kingdom of the Serbs, Croats, and Slovenes.

The new state has been created by the union of all the countries inhabited by the Serbo-Croatian race. These have grouped themselves around the Kingdom of Serbia, which is the "Piedmont" of this Slav "Resorgia-

CAPTAIN GORDON GORDON-SMITH

mento." These countries were the Kingdom of Montenegro and the former Serbian-speaking provinces of the Austro-Hungarian Empire: Croatia, Bosnia, Herzegovina, Carniola, Carinthia, Slavonia, Dalmatia, part of the Hungarian Batchka, the Baranya, and a part (roughly speaking, one third) of the Banat of Temesvar. The last three sections, made up of, probably, the most fertile region in all Europe, are generally grouped together under the title of the Voivodina.

JUGOSLAVIA HAS POPULATION OF THIRTEEN MILLION

The Voivodina is the most densly peopled portion of the new state, counting eighty inhabitants to the square kilometer. Serbia proper counts sixty; Bosnia thirty-seven; Croatia fifty-five; and Dalmatia and Montenegro have but twenty-five inhabitants to the square kilometer. This gives an average of fifty inhabitants for each of the 260,000 square kilometers the country contains, or a total population of thirteen million, a people closely knit together by race, language, and national aspirations.

If Jugoslavia is to be enabled to fulfill her high mission she needs all the aid and support that the United States can give her. Not political aid or military support. Only in her absolute independence can Jugoslavia fulfill her great destinies. By developing the resources of the country, increasing its wealth and production, its independence will be secured.

Jugoslavia is rich. She has everything that makes a country great. She possesses twenty million acres of virgin forest only awaiting the axe of the lumberman. Her mineral wealth is great. She has gold, silver, mercury, copper, zinc, lead, coal, and iron.

In her mountain streams and her swift-flowing rivers she possesses a reserve of electric force running to the millions of horsepower.

As a railroad center Belgrade has no rival in all Europe. No more favorable field exists for the investment of American capital.

But why, if all this be true, does it come that for half a century no attempt has been made to develop the natural resources of the country? The answer to this is—the dead hand of Austro-German policy.

Serbia lay right athwart the path of German ambitions, and while she remained independent and unsubdued brought the whole grandiose plan to naught. For thirty years, in consequence, nothing was left undone to prevent her increasing her independence by developing her resources.

Now Jugoslavia turns to the United States for aid. For this there are two reasons. The first is political. If Jugoslavia handed over to any European power the development of her immense economic resources she would at once arouse the jealousy of the others, as they would fear that the according of economic advantages would only be the thin end of the wedge for securing political influence and guiding the foreign policy of the new kingdom. No such fear is felt in the case of the United States. The intervention of American capital would be a cold commercial proposition without any *arrièré pensée* of political advantage. The whole matter would resolve itself into dollars and cents, and the Jugoslav people would be able to realize its political ambition, "friendship with all; alliance with none."

A second reason why Jugoslavia looks to the United States is that America is the one country which has not physically suffered from the war and which has all its powers and sources of supply, professional skill, and material and financial resources intact. Without professional skill Jugoslavia is helpless to work out her own salvation. Serbia's intellectual *élite*, men trained abroad in the schools and universities of Austria,

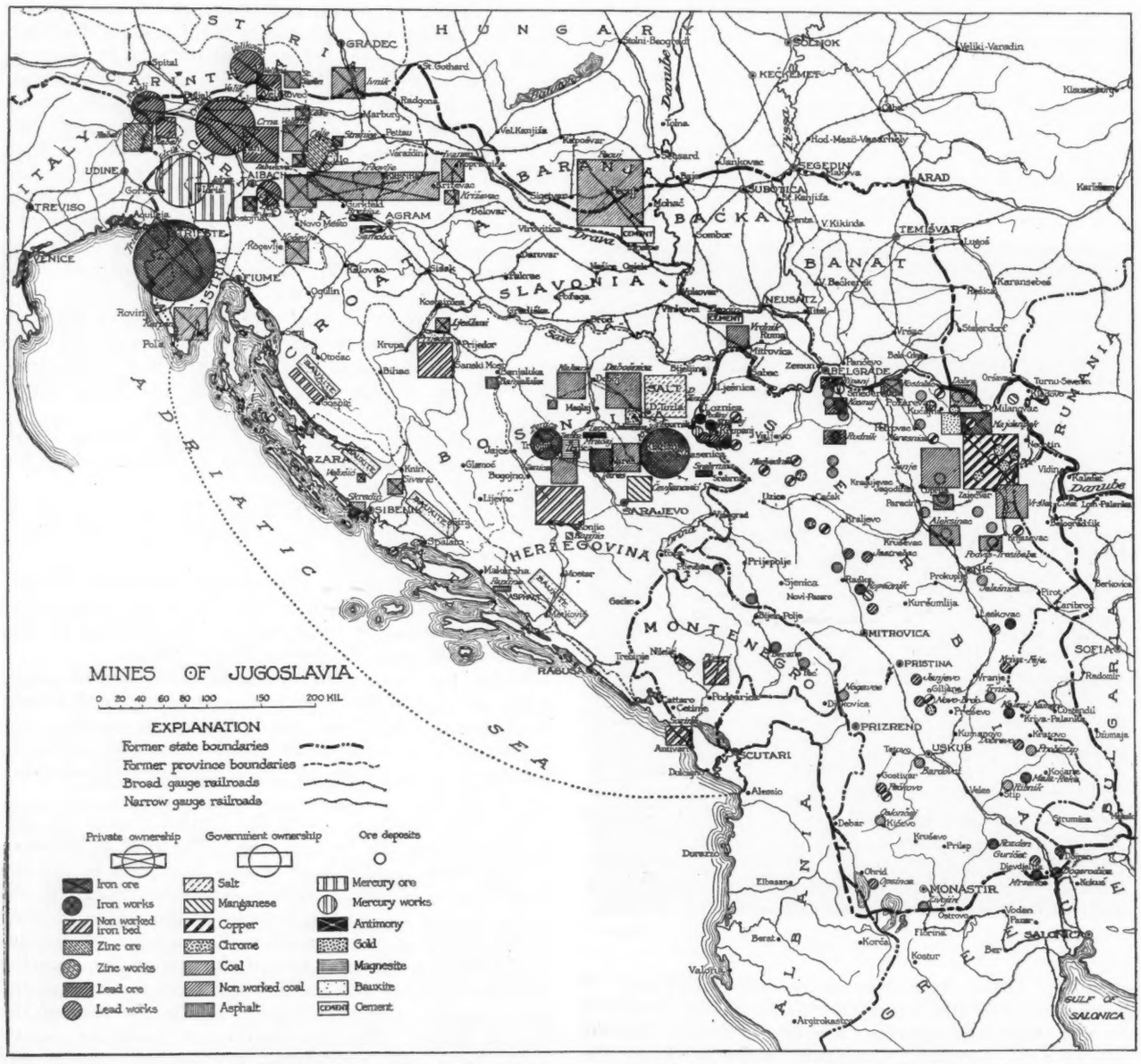
*Intelligence section, Headquarters Staff, Royal Serbian Army.

Germany, France, and England as engineers, electricians, doctors, and professional men generally, were, *noblesse oblige*, all officers of reserve in the army, and were killed off, almost to the last man, in six years of ceaseless war. It is for this reason that she has to appeal to the energy and professional skill of the United States to aid her in the development of her resources. One of the chief of these is the exploiting of her mineral wealth.

The archives of the newly annexed Austrian provinces are still in Vienna, so that I have not at my disposal such exact data as I have in the case of Serbia, but my readers may take my word for it that the mineral wealth of the former Austrian provinces is hardly inferior to that of Serbia and that they offer an attractive field for American mining enterprise. This article, however, will deal with Serbia.

In regard to the mineral wealth of Serbia a great deal of data is to be had, notably a report by Dr. Demetrius J. Antula, the distinguished Director of the Ministry of Mines. Dr. Antula is a geologist and mining authority whose reputation has spread far beyond the frontiers of Serbia.

It is known that the working of the mineral resources of Serbia dates from the most ancient times. The archaeological remains found in the old mercury mines of Avala, near Belgrade, bear evidence that these have been worked from as far back as the Neolithic Age. There are many traces to be found of Roman workings and debris heaps which testify to a large development of the mining industry in Serbia in the ancient past.



MAP SHOWING GENERAL DISTRIBUTION OF MINERAL DISTRICTS OF JUGOSLAVIA

After the fall of the Roman Empire the mining industry disappeared, and was restored only in the thirteenth century, at the time of the Namanya. At the opening of the fourteenth century the industry attained great development. The mines were the principal source of wealth of the ancient Serbian state of the Middle Ages. With the Turkish invasion the mining industry in Serbia, as also in the neighboring countries, began to diminish rapidly. Only the iron industry, on a very small scale, was continued in one or two places. During the Austrian occupation in 1718

mining work was resumed, after an interruption of three hundred years, but came to an end again in 1728. With the restoration of the Serbian state at the beginning of the nineteenth century mining was started at many points, and keen interest was awakened by the favorable results obtained by prospecting the copper, gold, and coal deposits.

Until a few years ago all that was known about gold in Serbia was that placers existed in the gravels of the Timok and the Pek, and of their tributaries. Lode deposits were recognized only in the first years of the present century. There are three principal types:

GOLD IN SERBIA

1. *Gold-Quartz Veins in Crystalline and Granitic Rocks*—Gold occurs in the crystalline rocks of the Department of Kraina, and prospecting has been carried on at various places, especially between Neresnitsa and Maidanpek. There existed in 1911 two mining concessions in this region, besides several prospecting rights. One concession was given to the Serbian Dredging & Mining Syndicate, Ltd., in Neresnitsa, in 1903, extending over 7,500 hectares (18,250 acres), and the other to MM. Georges Weifert and Felix Hofmann at Blagoyenkamen, in 1902 (the St. Barbe concession), covering 410 hectares (1,025 acres). Prospecting established the existence of numerous mineral-bearing quartz veins, containing sulphides of lead, copper, iron, and zinc. All these sulphides, especially the galena, are auriferous.

Quartz veins with auriferous sulphides were found near Ram, on the Danube; near Bela Palanka; and near Stanitchinci, at the foot of the north slope of Kopaonik. In the crystalline schists at Vratarnitsa, near Zayetchar, similar auriferous quartz veins were also found. Auriferous copper deposits are to be found in the granite formation of the districts of Tanda, Crnajka, and Isvor.

2. *Gold-Quartz Veins Occurring in Serpentine and Gabbro*—Gold formations in serpentine rocks are known only in the region of Deli-Yovan, where there are ancient workings, the most important of which is at Rusman-Gindusa, and is eight kilometers in extent. Several parallel veins have been discovered in this ground. These veins in general direction strike north and south, but in certain parts, as in the workings of Gindusa, they spread into a great number of small veins, and the gabbro itself is often impregnated with auriferous pyrites. The workings at Rusman have shown the continuation of a well-defined cross-vein for a length of 300 meters, and this vein extends at least 35 meters below the old workings.

In 1901 a concession was granted on this field covering 2,500 hectares (6,250 acres). The concessionaire built at Rusman a ten-stamp mill for testing the treatment and concentration of auriferous pyrites. The yield of gold in the ore was approximately 9.6 dwts.[1] to the ton.

3. *Gold in Volcanic Rocks*—The presence of gold in the volcanic rocks was proved by the placer workings of the Crna-Reka and its numerous tributaries. Traces of gold have been found in the andesitic rocks themselves, which are impregnated with pyrites. This shows that the andesitic formation of the Timok contains gold deposits whose nature recalls very much the gold deposits of Hungary, but of which it has not yet been possible to ascertain the importance. The extent of the ancient workings in this eruptive formation, however, shows that it would be worth while to investigate further.

[1]Approximately $9.89.—EDITOR.

PLACERS

Placer deposits have been discovered in the gravels of the Pek and its tributaries, in the valley of the Mlava, in the basins of the Poretchka and the Timok, and in the valleys of the Plavnitsa and of the Jassenitsa, in eastern Serbia; also in southern Serbia, at the base of Kopaonik, at Stanitchinci, Poppina, and in other places. No systematic research has been made except in the valley of the Pek, on the concession of the Serbian Dredging & Mining Syndicate, and in the valley of the Bela Reka, upon the prospecting concession of M. Weifert.

Tests of the gravels in the valley of Pek showed that these contained a workable quantity of gold; on an average one franc's worth of gold is found in each cubic meter of sand. The gold is found to a depth of five to six meters, which is very suitable for washing. In the valley of the Pek the area which was investigated will suffice for working during twenty-five years by four dredges, which treat about 3,000 cubic meters of gravel per day. The Serbian Dredging Syndicate had two dredges working at the beginning of 1905, which produced ninety-two kilograms of gold. During that year two more modern dredges arrived and began work.

The cost of the extraction of the gold was reduced to 30 centimes per cubic meter, and it may therefore be concluded that these workings will give satisfactory results. The tests made in the valley of the Bela Reka also showed that the gravels of this river contain a considerable quantity of gold. Here also the gold is found to a depth suitable for dredging, and over a sufficient area to make profitable operations possible. Dredges suitable for the washing of gold were set to work in 1905 in this valley. In view of the considerable extent of placer gravels, and the evident importance of ancient exploitation, the government began in 1905 tests of the gravels of the basins of the Poretchka and the Timok.

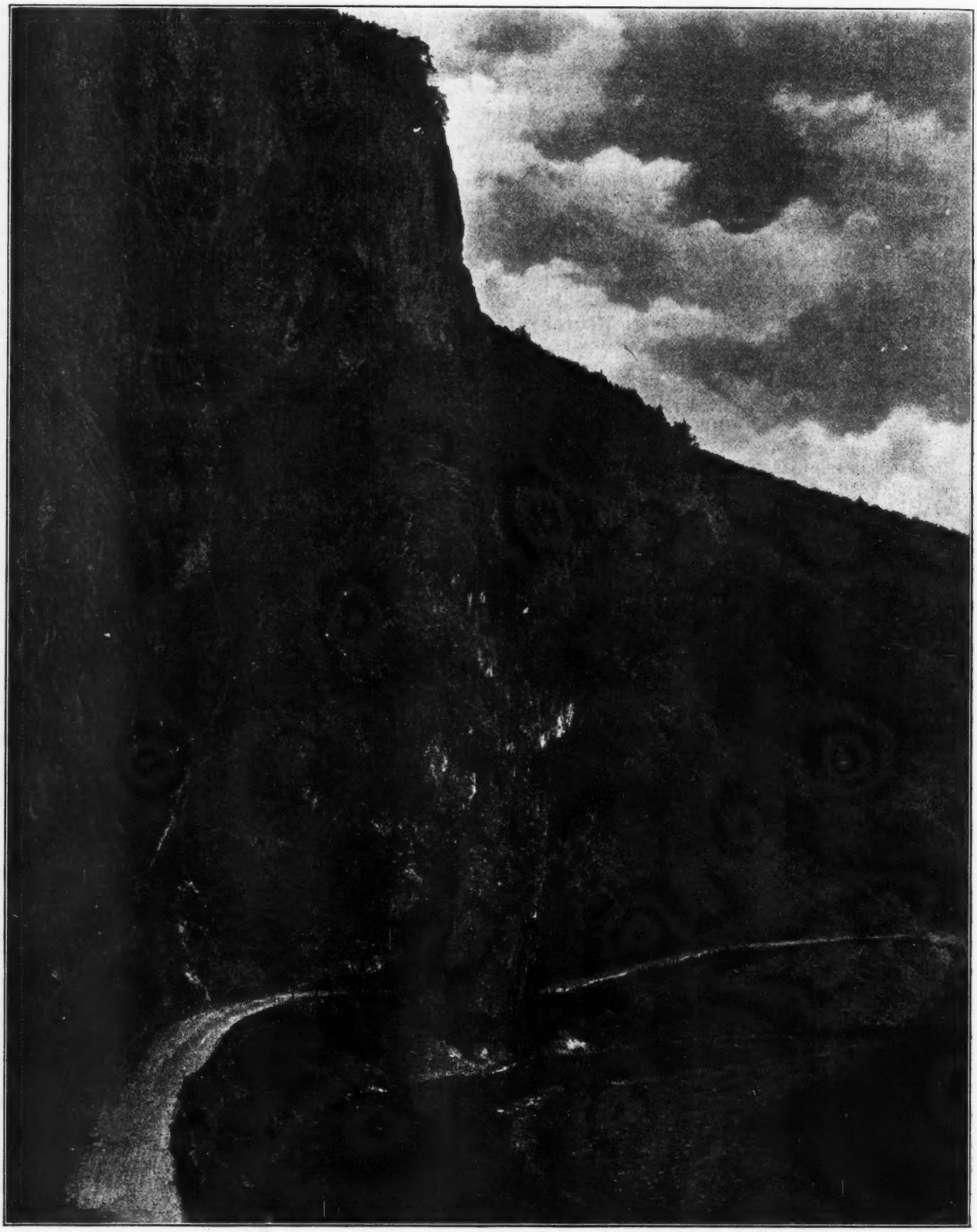
MERCURY DEPOSITS

The gold deposits are far from being the most valuable part of the mineral wealth of the country. There exist, for example, very considerable mercury deposits. Cinnabar is found at Avala, near Belgrade, and in the villages of Brajici, Bar, and Donja Treshnica. The mercury deposits at Avala were the first to attract attention. For some time work was carried on with considerable success, but later all the workings were abandoned. The cinnabar, together with metallic mercury, baryte, and pyrites, is found at Avala in a porous quartz in serpentines.

From 1885 to 1891 a total of 7,796 tons of mercury ore was treated, containing on an average 1.416 per cent of mercury, which produced 79,823 kilograms of mercury.

LEAD MINES

Lead deposits are frequently found throughout the country, and some of them contain also silver and gold. They are generally found in the Mesozoic limestones, and especially the volcanic rocks of recent age, or in irregular masses in the limestones, near the igneous rocks. Deposits of lead ore have also been found in old workings, at the contact of alaskites with slates.



THE KATCHANIK PASS IS AN OPENING BETWEEN THE CHAIN OF THE KARA-DAG AND THAT OF THE SCHAR. HEMMED IN BETWEEN HIGH WALLS OF ROCK, AT THE FOOT OF WHICH FLOWS THE LEPENAC, A TRIBUTARY OF THE VARDAR, IT UNITES THE PLAIN OF SKOPLIE TO THAT OF KOSSOVO. THERE IS HARDLY ROOM ENOUGH FOR A ROAD WHICH IN PLACES RUNS ALONGSIDE BUT GENERALLY ABOVE THE RAILWAY LINE

There are several important centers of lead mining which merit being studied separately. These are those of Podrinje, Avala, Kosmaj, Rudnik, Kopaonik, Ruplje, and Kucajna.

At Podrinje the lead ores have been worked continually for centuries. The deposits are worked by the state. The center of these workings is the mountain of Krupanj, lying sixty-three kilometers from the landing stage at Shabats, on the Save, where there is a smelter. In these works the lead ore from Postenje was also treated, and all the lead and antimony ore of the surrounding region was smelted (such as the lead ores of Zavlaka and the antimony ores of Kostajinik and Zayetchar.) At Postenje, a distance of fifteen kilometers from Krupanj, the lead ore is found on limestone near serpentine, in a vein varying in width from a few centimeters to two meters. The ore is carbonate, with some residual primary galena. It is very easily smelted.

There are also important deposits at Selanats, not far from the Drina. Here some veins of mixed sulphides (galena, chalcopyrite, blende, iron pyrite, in quartz and in calcite) are found near igneous rocks and in the schists. The lead from this ore contains from 0.02 to 0.237 per cent of silver. Work was carried on from 1874 to 1900, with few interruptions, and in all 1,548 tons of lead was extracted.

At Avala there are traces of Roman workings, and others of more recent date. Ruins, drifts, shafts, and dumps prove the importance of the old mines. At Ljuta Strana, in the Valley of Tapavac, seven kilometers from the station of Ripanj, lead-bearing veins were found at the contact of Cretaceous limestone and rhyolite. These veins were followed to a depth of 120 meters below the lowest level. The veins contain principally galena, with some blende, pyrite, and chalcopyrite.

Silver-lead deposits are also found in similar geological formations at Zuce and on the Creveni Breg, near Avala. At this latter place the French company Société des Valeurs Industrielles et Minières obtained a concession of 400 hectares (1,000 acres) in 1901. Several rhyolite dikes striking east to west have been followed by the ancient workings, for the deposits themselves are closely related to these rhyolitic veins, being found either in them or at their point of contact with schist and limestone. These veins resemble closely the ore of Ljuta Strana, but with a greater proportion of silver, amounting to from 0.183 to 0.4308 per cent of the lead. A chain of similar deposits leads from Avala toward the south via Kosmaj, Rudnik, and the valley of the Ibir to Kopaonik.

At Rudnik there is a mining field well known in ancient times, where copper, lead, silver, and gold were extracted. Mixed sulphide ores at Rudnik are found at the contact of the alaskites with the Cretaceous limestones and sandstones. Two concessions, amounting to 4,530 hectares (11,325 acres), were given in 1894 to M. Mihailovitch, a former Director of the Mining Section. The work done proved important mixed sulphide deposits, and tests were made with regard to the concentration of the ore.

The mountain of Kopaonik and its mountainous district, near the southern frontier of Serbia, abound in mineral deposits, but these have not been closely studied. Lead deposits and old workings have been found in many localities.

Near the village of Ruplje there are veins at the contact of the alaskites and mica schists. Generally these contain galena, but sometimes blende and pyrites predominate. These ores contain a variable amount of silver, estimated at from 0.3 to 0.4 per cent of the lead. A concession of 800 hectares (2,000 acres) (Djurina Sreca) was granted to M. Weifert and to the French Société Industrielle et Metallurgique.

The workings of the lead deposits of Kucajna go back to a very remote date. The ancient miners apparently knew how to work the high-grade lead carbonate ore and leave the poor ore containing much pyrite and blende. They also ignored all the galena, which was worked by the owner of the mines from 1864 to 1892. The mining field extends to about four square kilometers. The deposits occur rarely in regular veins, more often in lenticular masses of different forms, found at the contact of the Cretaceous limestone and igneous rocks, or between the limestone and a volcanic breccia, or in the limestones themselves.

In these ores lead, iron, and zinc sulphides predominate, as well as the products of their alteration—cerussite, limonite, and calamine. Gold and silver are contained in the ore. From the results of the smelting work it is apparent that 1,081 tons of mineral ore were treated in eight years, which produced 265 tons of lead, 62.5 kilograms of gold, and 1,092 kilograms of silver. The quantity of gold varied considerably from 6 to 650 grams per ton of ore, averaging 57 grams per ton of ore. The average percentage of silver was 1.112, or 455 grams per 100 kilograms of lead. Compared with other lead ores in Serbia, those of Kucajna are the richest in gold and silver; and these metals are associated with the pyrites and blendes. The deposits (of 160 hectares) were granted in 1862 to M. Hofmann.

Zinc Ores

Serbia is rich in zinc. Zinc ores are found in connection with galena, pyrite, and chalcopyrite in many deposits, of which the most noted are those of Kucajna, Zavlaka, and the mountains of Rudnik. The calamine deposits of Kucaja are fissure veins, and calamine is also found in the form of incrustations on the metallic sulphides. The calamine is often pure, and contains from 50 to 55 per cent of zinc, and it is usually associated with limonite. During three years from 1891, 291 tons of zinc ore were treated at Kucajna, with a yield of 121 tons of zinc, which gives an average percentage of zinc of 21.5 in the ore. These zinc deposits were granted in 1862 to M. Hofmann.

Zinc ore is found in many parts of the mountains of Rudnik, occurring with lead. These deposits are sulphides containing 10 to 30 per cent of zinc. Similar deposits are also found between the villages of Zavlaka and Srpulja in irregular masses, in the Triassic limestone, and in proximity to outcrops of trachytic rocks. The proportion of zinc varies from 24 to 56 per cent. It is interesting to note that cinnabar in thin incrustations is found with the calamine of Zavlaka.

Copper Deposits

Copper deposits are found in Serbia, especially near serpentines, in lenticular masses of chalcopyrite and iron pyrite, together with oxides, and also often in association with other minerals in the trachytic rocks, or at the contact of these rocks with the limestone or with the crystalline schist. They also occur in the red sandstone in the form of a copper impregnation.

Copper ore is found in the whole of the serpentine

mass forming the mountains of Suvobor, Maljen, Bukovi, and part of the northern base of Povlen, in the Department of Valjevo. These generally occur at the contact of the serpentine with Cretaceous limestones. These depoosits are lenticular, but because of their constant strike from southeast to northwest they present many of the characteristics of veins. They contain sulphides and oxides of copper. At the mine of Rabelj, in 1903, 3,820 tons of copper ore was treated and 151 tons of black copper obtained—that is to say, 3.5 per cent of copper. In the limestone at its contact with the serpentine irregular masses of cuprite and of chalcocite have been found in the village of Planinitsa, and there

THE BABOUNA PASS SEEN FROM THE DEFILE. THIS PASS IS THROUGH THE PICTURESQUE MOUNTAINS WHICH DIVIDE THE HEADWATERS OF THE TERNA RIVER FROM A TRIBUTARY OF THE VARDAR

are often masses of native copper weighing from 100 to 150 kilograms.

All the work which has been done as yet is in the nature of prospecting, although the analysis of specimens has shown that they contain a fair amount of copper. On the highland of the Department of Tchatchak there are copper ores in serpentine, and here are found many ancient workings and old dumps. East of Kniajevats there occur in the gabbro rocks quartz veins with chalcopyrite, iron pyrite, and bismuth.

The mineral area of Majdanpek is marked by gossan. It stretches from north to south for more than four kilometers, and its greatest width is about 600 meters. The deposits appear in the form of irregular masses and broken veins, and also as impregnations, which occur at the contact of the andesite with the limestone and the crystalline schists, or in the altered andesite.

Numerous ancient workings and dumps show to what an extent the ancient workings of Majdanpek extended. It was certainly worked in the time of the Romans, and especially in the period of the medieval Serbian state before the Turkish invasion. Documents which are in the archives of the mines of Oravitsa show that the work in the mines of Majdanpek began again during the Austrian occupation, that the production of copper was considerable at that time, and that the ore contained an average of 8 to 10 per cent of copper.

Many authorities who later studied the deposits came to the conclusion that they possessed great importance; in fact, soon after the establishment of the Serbian state the development (1850 to 1860) on a large scale of the iron and copper industry at Majdanpek began. Much money was spent, and at this time Majdanpek was recognized to be the best organized mine of the east of Europe. Owing, however, to an interruption in the production of iron, the state was discouraged and disposed of the deposits to private individuals. Today the iron industry is completely abandoned, only the copper ore being worked.

At Majdanpek are found ores of copper and iron sulphides and oxides, together with a small amount of zinc and lead sulphates. The chalcopyrites are usually to be found together with iron pyrites and magnetite. There are often great masses of iron pyrites near which are situated masses of covellite containing a great percentage of copper. The decomposition of the primary deposits has produced copper and iron oxide ores. It is in this way, also, that the important limonite deposits which were utilized for a long time for the production of iron were formed. The oxidized ore contains generally more copper than the unchanged sulphides. This is the reason why many of the deposits of iron pyrites have been abandoned, as they contain only from 0.3 to

0.5 per cent of copper, whereas in the oxide deposits there are from 6 to 12 per cent.

The Majdanpek mines, covering 16,000 hectares (40,000 acres) were leased in 1902 to a Belgian limited company. From 1870 to the end of 1903 upward of 115,000 tons of ore were treated, giving 4,350 tons of copper. The average proportion of copper in the ore is therefore 3.78 per cent. The black copper when refined at Brixlegg in 1901 gave 94.10 per cent of copper, 48.6 per cent of iron, 10 grams of gold, and 270 grams of silver per ton of copper. An analysis of the black copper in 1904 gave the following: Copper, 96.4 per cent; iron, 2.10 per cent; sulphur, 0.67 per cent; zinc, 0.53 per cent; silver, 411 grams per 1,000 kilograms; gold, 39 grams per 1,000 kilograms.

There are numerous quartz veins of auriferous chalcopyrite in the granite mass of the Department of Krajina, near the villages of Tanda and Luka. Copper ore occurs in the form of isolated masses in the limestone to the east of Golubats, on the mountain of Ridanj, which is undoubtedly a continuation of the mining region of the Banat, and also extends far toward the south to Vukan, where there are very large dumps, as well as outcrops of copper ore.

The copper deposits of Bor and Krivelj, in the Department of the Timok, occur in connection with the andesitic rock. Here there are also ancient workings, which form the best indication for the study of the various deposits. The ancient galleries and shafts are arranged in a linear direction, and may be grouped into several parallel zones. Their direction is, in general, from north to south, with slight deviations toward the northwest. The general direction of the ancient workings, which follow the metallic veins, is parallel with the general direction of the volcanic dikes which may be followed for a distance of 300 kilometers in Serbia and the Banat.

There are indications in the old workings of this region that the presence of gold had been recognized, and that gold has been recovered by washing. It is therefore probable that the ore interested the old miners only as a source of gold, and that they abandoned the work when they reached the primary ore, which is found at the shallow depth of twenty-five to thirty meters.

The prospecting work has demonstrated five parallel veins, which may be followed by their outcrop, and by the old workings, for a distance of ten kilometers and a width of two kilometers. The most important workings occur in the village of Bor, and had for object the determination of the depth of the deposits. A drift was begun at Bor, thirty-two meters below the ancient workings, and following their direction through a propylitized mass of andesite. The propylitization was so far advanced that only a quartz skeleton remains of the original rock, in which there often occur cavities with the shape of feldspar and ferromagnesian minerals. The percentage of copper in the ore was favorable. Of the thirty analyses made, taken from each meter of the mass of ore, twenty-six gave 8 to 25.6 per cent of copper, eleven from 5 to 8 per cent, and only two 3.2 per cent. All the analyses showed gold from traces to ten grams per ton of ore. The volume in sight amounted to 85,130 cubic meters, or 255,390 tons.

The mineral deposits of Bor are related by their geological conditions and by the period of their origin to the copper deposits of Majdanpek, and also to those of the interior zone of the Carpathians, and they show a certain semblance to those of Nevada and Colorado. On the other hand, the deposits of Bor differ from all these by their mineralization and resemble rather the well-known pyritic masses of Europe (Roros, Ramelsberg, and Huelva). A concession of 2,400 hectares was given in 1903 to a French company. Its exploitations showed that it was one of the richest copper mines in Europe. It was in full operation at the time of the German invasion. During the period of occupation the Germans extracted thousands of tons of copper.

Impregnations of copper ores, malachite and azurite, are found in many parts of the country, but only in small quantities. There are also other outcrops of different kinds of copper ore in various districts, but these have not been carefully studied.

ANTIMONY

Antimony is found in great quantities in Serbia, and the most important deposits have been discovered in Podrinje. At Zayetchar there are two kinds of antimony deposits. The proportion of antimony in them varies greatly. A concession for these deposits, extending over 1,660 hectares (4,160 acres), was granted to a Serbo-French company in 1898. From 1901 to 1903 this company treated 13,537 tons of ore, containing 12 to 14 per cent of antimony, with a yield of 1,460 tons of oxide of antimony, which was transformed into 825.5 tons of regulus. There are also deposits of antimony in other parts of the country, but these have not been studied.

NICKEL

Nickel ore occurs in such small quantities as not to be worth working. Chrome exists in the form of chromite on the mountain of Suvobor and near Kraljevo, where it appears in isolated masses in serpentine. Analysis has shown that the ore, of which several hundreds of tons have been obtained, contained an average of 50 per cent of chrome oxide. There are also other chrome deposits, but none have been worked systematically.

DEPOSITS OF IRON

The iron industry has not yet come into existence in Serbia, apart from some attempts which have failed, although the country is rich in iron ore. Investigations have been made only on a small scale, and it is impossible to judge the exact nature of the deposits. The most important deposits are of magnetite in the crystalline rocks. There are also iron deposits in irregular masses in the serpentine ore, in conjunction with other minerals, near the eruptive rocks, and isolated deposits in large or small masses or in layers in the sedimentary formation, principally in the cretaceous limestones.

MANGANESE

There is no doubt that a considerable amount of manganese ore exists in Serbia, generally associated with limonite, but these deposits are as yet little known. One of the deposits of the Department of Kragujevats is, however, known to contain up to 42 per cent of manganese. Natural sulphur is rare in Serbia, and it is never found in masses sufficient for working. Bituminous schists are found in many parts of the country, and many of them deserve to be studied further because of the quantities of bituminous matter they contain.

COAL

There are four kinds of coal fields in Serbia, which should be considered according to their geological age

—coal of the Carboniferous period, Liassic and Cretaceous coal, Tertiary brown coal, and Tertiary lignitic coal. In the Carboniferous basin lying between the Save and the Pek there are several beds of coal, but owing to the lack of adequate study it is impossible to estimate the exact value of these coal beds, which are, however, composed of coal of excellent quality. The fossil plants found in these coal deposits show that this coal is of the same age as that of Moravia, upper Silesia, and the basins of the Saar and the Rhine. Of the many deposits of Liassic coal, several are being worked. These are the mines of Dobra, lying on the Danube opposite to the Drenkova mines in Hungary. The coal formation extends over a length of four kilometers. There are three principal seams, with varying widths of from one to ten meters. Unfortunately, there are layers of sandy clay among the coal, which make it necessary to wash the coal in a special manner, resulting in a loss of 28 per cent. This mine, covering 1,200 hectares, was leased in 1887 to a company, and from 1900 to 1903, a total of 61,491 tons of coal was extracted. Another mine which is being worked is near Zayetchar, the deposits having a length of ten kilometers. There are several beds, but only one, varying from 2 to 3½ meters in width, which is fit for working. From 1888 to 1904 the total production amounted to 275,059 tons.

To the east of the mountain of Rtanj outcrops of coal are found over an area of over forty kilometers in extent. At Boljevats, in the department of the Timok, coal beds one to eight meters in width have been discovered. The coal is of good quality and gives 80 per cent of coke. There are also known coal beds at Vina and Podvis. In the latter place a coal vein of two to three meters has been opened, and analysis shows that the coal possesses 7,000 calories.

Extensive Tertiary Coal Beds

Coal beds of the Tertiary period occur all over Serbia, in basins in the Cretaceous rocks or along the Drina, the Save, the Morava, the Danube, and the Timok. In these river basins only recent lignites are found; outside them there is brown coal. The principal mines of this coal are at Senje. Here is a bed of brown coal having from seven to eight meters as an average width, and with a known length of 900 meters. This mine was opened by the government in 1889, and in 1897 it was handed over to the railway administration, which now possesses a concession of over 450 hectares. From 1897 to 1904 the production of coal amounted to 522,770 tons, and in 1904 the production was nearly 100,000 tons.

In the neighborhood of Senje a coal bed of much greater value has been found, as there is a known quantity of coal of over 2,000,000 tons. There are similar coal beds in all the regions surrounding Senje, especially those of Dilje and Cicevats. At Jelasnitsa, near Nish, and at Jarandol, there are also important deposits, the coal at the latter place being among the best in Serbia. In the valleys of the Drina and the Save there are few known coal beds, although there exist in various localities outcrops of lignite. In the valley of the Morava there is much lignite, and this is worked at several places, notably at Kraljevats, by a Belgian company. The valley of the Danube is much richer, and at Kostolats there is a mine of lignite producing about 20,000 tons annually. The valley of the Timok is also richer in lignite, but has not been seriously studied.

Serbia is remarkable for the wealth and variety of its commercial and industrial stones. There are a great number of kinds of granite. marble, lithographic stone, and millstone, which are in great quantities, and which compare in quality with the best foreign varieties. Largely because of the lack of roads and railways, little has been done in the working of this source of wealth, but it will inevitably develop with the means of communication. Of special interest for other countries is the great amount of lithographic stone, which in one place covers an area of over 95 hectares, with a depth of 200 meters. There are many places where limestones occur suitable for the production of cement, and in Ripanj and Ralja cement plants already exist.

The Control of Mines in Serbia

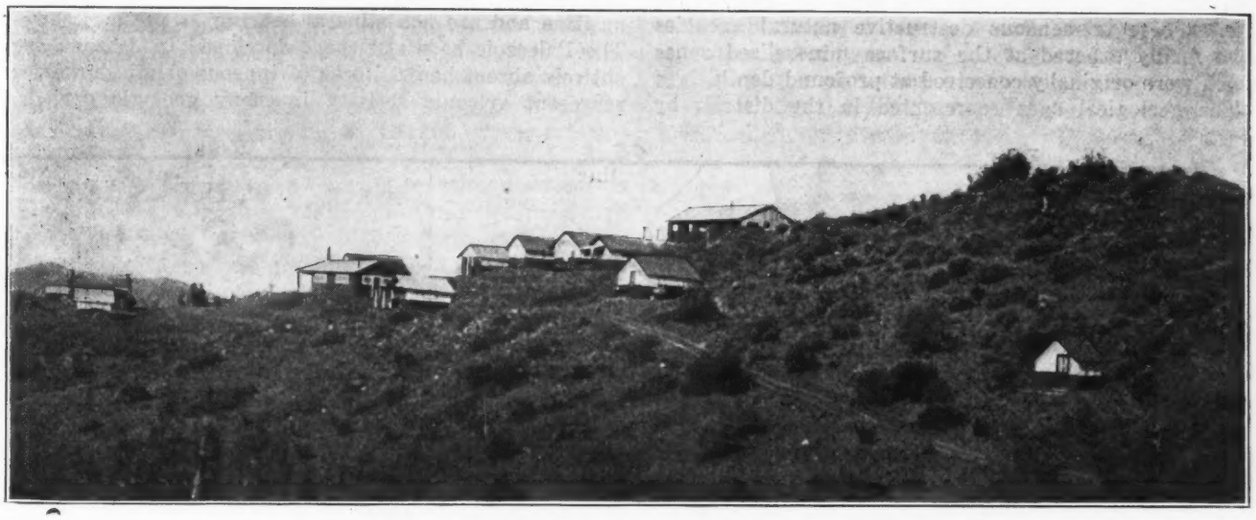
In all matters relating to mines and mining the administrative and judicial authority is vested in the Ministry of Agriculture, Commerce, and Industry, which acts through the Service of Mines and the Mining Council. All concessions for mines are granted by the Minister. He also introduces the necessary laws, and imposes penalties according to the reports of his special departments. The supreme court of appeal is the Council of State. Concessions are of two kinds—prospecting rights and working rights. The former are divided into simple rights and exclusive rights, and these rights have been granted over an area of 200,000 acres. The concessions granted are comparatively few as yet, and cover about 40,000 acres. The grant of prospecting rights carries with it the ultimate possibility of obtaining a concession if the requisite work is done within the necessary period, if sufficiently rich mineral deposits are located, and if the individual or company applying for the concession can show satisfactory evidence that it possesses financial means to carry on the undertaking.

Despite the undoubted wealth of Serbia in mineral resources, it must be said that the mining industry has not yet begun, and this although 634,000 francs' worth of mineral products in 1895 had increased in value in 1907 to over 3,500,000 francs. This, as I have said, is to be attributed in a large degree to the constant hostility of the Central Powers and their efforts to hamper Serbia's economic progress.

The most interesting development has undoubtedly been the increase in the production of coal, ten years having recorded a production of 1,400 tons of hard coal transformed into an output of over 53,000 tons, and 41,000 tons of brown coal becoming 172,000 tons. The exploitation of the great copper deposits promises in the future an enormous increase in the mining industry of Serbia. What is needed is foreign capital intelligently utilized.

South Australian Iron Ore

The iron ore produced in South Australia, according to Consul H. P. Starrett, comes from the mines at Iron Knob and Iron Monarch, situated thirty-four miles from Hummock Hill. This ore forms two hills, which enables it to be worked by open quarrying. It is estimated that there are about 110,000,000 tons of ore in sight. It is a hematite, 66 per cent metallic iron, with no excess of sulphur, phosphorus, or titanic acid. The ore is not treated in South Australia, but is shipped to the steel works at Newcastle, New South Wales, and it is the chief supply of that plant. It is stated that the amount of ore available is sufficient to meet all Australian requirements for many years.



CAMP AT RED ROVER MINE, CAVE CREEK DISTRICT

Ore Deposits of Cave Creek District, in Arizona

Geology of Area Twenty-eight Miles North of Phoenix Described—Only Deposit Developed of Present Importance That of Red Rover Mine—Characteristics of Principal Type of Outcrops Discussed

By Alfred Strong Lewis
Written for *Engineering and Mining Journal*

WITHIN the last two years I have made several professional trips to the Cave Creek mining district, in Maricopa County, Ariz., for Eastern clients holding mining interests therein. In passing over and through the district, and in connection with my examination of certain specific properties, I was greatly impressed by the appearance of the general surface conditions, and therefore determined to make a careful examination, with the purpose of preparing a geological map of the district. This article is based on such survey and examination.

First I made a thorough search of all possible sources for information relating to the district, but found nothing except that its northeast corner was included in the quadrangle covered by the Bradshaw folio of the U. S. Geological Survey. Careful study was made of the Government geological maps and other data relating to the developed districts both north and south of the Cave Creek district, in which the same surface conditions are disclosed as I found to exist in the latter.

Mapping the District

Having completed the study of the adjoining territory I proceeded to examine the Cave Creek district about July 1, 1919, and by Oct. 1, 1919, I had gone over all of the country which had exposures of the older pre-Cambrian formation. I found large areas within the district to be covered by volcanic agglomerate, which was not mineralized and was therefore of no economic importance. These areas I simply sketched in and did not attempt to differentiate. The final results of my work are embodied in the geological map on page 714.

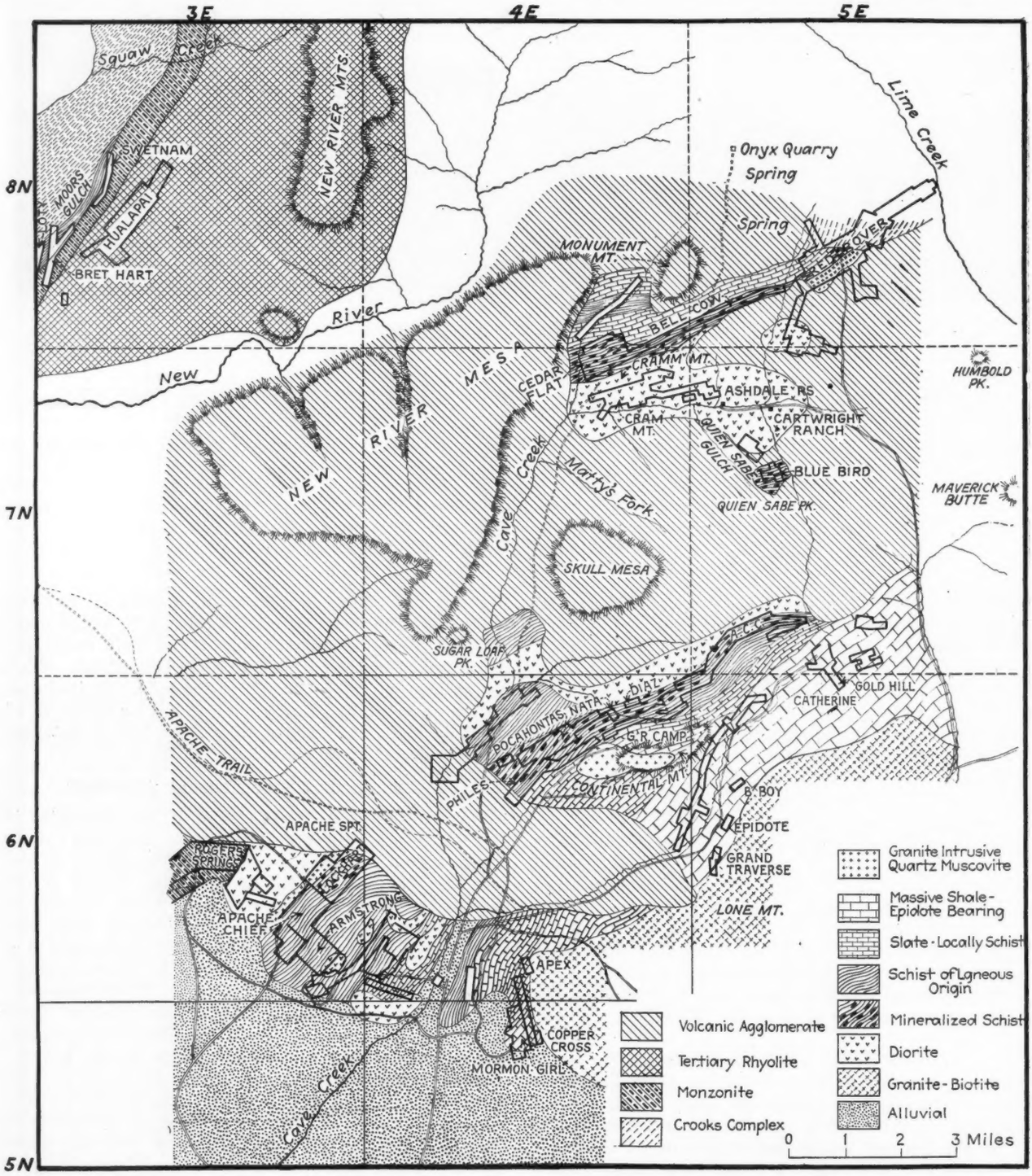
The Cave Creek district is twenty-eight miles due north of Phoenix, Ariz. The road leading out of Phoenix is paved for the first eight miles and from that point passes through the Paradise Valley with slight grades. The elevation of the district varies from 2,100 ft. in the lowest part of the basin to a maximum of 5,000 ft. at the higher peaks. The main outlet for the drainage of the entire district is Cave Creek, which has an average fall of 200 ft. to the mile. At its headwaters near the Red Rover mine it has an elevation of about 4,000 ft. and twenty miles from here it emerges into the desert at an elevation of 2,000 ft.

Evidences of Great Erosion Apparent

Following up Cave Creek, a rim of low mountains is first encountered through which the stream has cut its course. This rim forms the southern boundary of the district. These mountains are abruptly covered at the base of their southern slope by the alluvial material of Paradise Valley. At the foot of the northern slope they are covered by volcanic agglomerate, which covers a basin-like area about three miles wide, feathering out to the east, but widening to the west. High ridges and mesas then succeed one another for several miles. Cave Creek has cut a deep gorge in this part of its course. The ridges and mesas finally give place to open country with an average elevation of about 3,500 ft. and the creek branches out into numerous small washes and ravines. Erosion has been very great, as evidenced by the great depth of the fill in Paradise and Salt River valleys. These hills, which now stand out alone and disconnected, were once part of an enormous mountain system extending from the interior of Mexico diagonally across Arizona and continuing through Nevada. Many thousands of feet have been torn from this mountain system by powerful forces of nature operating through millions of years. This material has been washed down into the great chasms at their feet. The chasms have been filled and leveled into broad valleys of great agricultural activity, and the once lofty peaks have been

dwarfed and diminished into low hills of insignificant size. These tremendous destructive natural agencies have finally exposed at the surface mineralized zones which were originally conceived at profound depth.

The geological ages represented in the district by



RECONNAISSANCE MAP OF AREAL GEOLOGY OF CAVE CREEK MINING DISTRICT, MARICOPA COUNTY, ARIZ.

sedimentary deposits are confined to the oldest and the youngest of all exposures in Arizona. The pre-Cambrian sediments, which have been highly altered, metamorphosed, folded and finally compressed into shales, slates, and schists, are mineral bearing, but the Tertiary (or Quaternary) deposits, composed of volcanic agglomerate, are for the most part in their original position and are non-mineral bearing as far as known. The Paleozoic beds elsewhere developed in Arizona are entirely absent here. Rocks of igneous origin, however, represent volcanic activity in many geologic periods. Granites of Algonkian age are present; siliceous porphyries originally bedded in pre-Cambrian oceanic sediments, and now forming nearly vertical zones of schist; later granite intrusions in the schists diagonal to its strike; greenstone bedded with the schists and diorites in large marginal masses as well as small and

large dikes irregularly intruded into the schists; and narrow granite prophyry dikes developed for miles in length and running with the strike of the schists, some highly sericitized, some highly siliceous.[1] At certain points as many as six of these dikes running remarkably parallel and spaced from 300 to 600 ft. apart are exposed.

Upon the southeastern margin of the districts is exposed a coarse-grained biotite granite batholith which covers an area of about 2,000 square miles. The granite weathers into peculiar shaped boulders which have almost the identical appearance of the boulder batholith granite exposures of Butte, Mont. The batholith, if of post-Paleozoic age, may have doomed and broken up the Paleozoic beds, rendering them easy prey to the erosive action of the Verde and Salt rivers. Deformation is evidenced by highly contorted rocks in many localities, as well as the change in the strike of the schist zones. There is a remarkable persistency in this strike. The normal strike seems to be N 42° E, and the deformed strike in almost all cases is N 60° E.

Quartz Lenses and Stringers Prominent in Schists

At certain points the schists contain large and small lenses, stringers, and bands of jasper and quartz. Some of these lenses are prominently developed. They are usually from 10 to 50 ft. wide and from 200 to 500 ft. long. They do not occur in straight lines, but are offset in a somewhat regular manner and occur in the softer, more highly sericitized and bleached zones of schist and usually in proximity to the acid-porphyry dikes. Throughout these mineralized zones are distributed many small outcroppings of copper, silver, and gold minerals.

The exposures in the Cave Creek district are similar to those found at the surface in the proven districts of Arizona. An examination of the ore outcrops throughout the district discloses clearly the fact that, in the main, the gold, copper, and silver have been leached, leaving occasional shoots or kidneys of ore which have escaped leaching by reason of some topographical or other condition unfavorable to leaching. Such residual oreshoots are found to carry values in gold, silver, and copper running from $10 to $60 per ton.

Red Rover Deposit Only One of Importance to Date

There is only one property in the district which has done sufficient development work to uncover anything worthy of the term "ore deposit." This property, known as the Red Rover mine, is in the schist zone. The deposit at the surface is in an irregular inclined seam and shows copper carbonates carrying as high as 2,000 oz. of silver per ton. The ore occurs as lenses in the schist and has been developed so far to a depth of 500 ft. A very interesting occurrence is to be seen in the shaft which passes through about 30 ft. of schist impregnated with native copper in the form of thin scales, bright and wonderfully distinct until tarnished by exposure to the air. The principal deposit opened up on the 300- and 500-ft. level shows masses 3 to 4 ft. wide, of copper glance carrying 400 to 700 oz. silver per ton. The other properties in the district have nothing but outcrops to recommend them.

It has been stated many times in recent mining literature that the mines of the future must be found by the application of geological deduction based upon surface and other data available. It therefore seems proper to describe the general characteristics of the principal types of outcrops exposed in this district. For convenient description the district can be divided into three zones.

Copper Carbonates Frequent Along Batholith Contact

The first zone is from one mile to two miles wide and borders the northwestern contact of the granite batholith. It is composed of highly metamorphosed banded shales. Blocky epidote rock is extensively developed in this zone, and in places there are ledges composed of epidote, quartz, and dolomite intimately mixed. This zone gives place to slates along its western margin. Copper carbonates carrying several dollars per ton in gold and silver outcrop at many points within this zone, always in association with quartz or epidote.

The Mormon Girl deposit, in this zone, is formed in contact with and just above an inclined foot wall of

GRANITE POINT—A PREHISTORIC "LOOKOUT" IN THE CAVE CREEK DISTRICT

barren quartz. This quartz is 6 to 8 ft. thick and represents two generations of silicification, one of white quartz, which has been crushed into angular fragments, and the other a dark quartz, which has been deposited around the irregular fragments of the white quartz making the present hard compact foot wall. This foot wall is smooth, continuous, and unbroken. On top of it has been deposited copper-gold-silver-bearing quartz of an average value of $40 per ton and from 4 to 5 ft. thick. A few hundred feet below this the ore disappears.

Little Copper in Second Zone

The second zone begins at the edge or border of the slates and extends to the contact of diorite and igneous complex. It is several miles wide and is all schist. Within this belt is a narrow, highly mineralized area that is exposed for about fifteen miles and is 600 to 1,200 ft. wide. It consists of highly altered soft sericitized schist in places highly twisted and contorted. In coloring it ranges from pearly white through the various shades of yellow and occasionally is deep red. In

[1]The Pre-Cambrian rocks are designated on the accompanying map as "Schist of Igneous Origin," "Mineralized Schist" and "Crooks Complex." The latter formation, shown in the northwestern corner of the map, is the equivalent of the formation so named by the U. S. Geological Survey, in the Folio of the Bradshaw Mountain Quadrangle. It comprises irregular bands of diorite, granite, aplite and schist, with some breccia.—Editor.

other places, it is bleached or gray and full of innumerable quartz stringers. Very little copper is in evidence in the outcrops, but several location cuts exposed copper stain a few feet beneath the surface.

Elsewhere in this area many huge silicified outcrops occur, showing jasper and siliceous hematite. In connection with these there are innumerable outcroppings of carbonate, oxide, and some sulphide of copper occurring in patches or irregular impregnations.

The third zone lies along the contact of the schist and the diorite and other igneous intrusions and is the western part of the mineralized section of the district. There are several brecciated siliceous zones, from 50 to 300 ft. wide and of undetermined extent, which contain ore averaging $2 to $5 in gold per ton. Ore averaging as high as $12 per ton has been taken from narrower enriched channels within the main low-grade orebodies.

In the diorite there are many outcrops showing strong shearing action. In these zones impregnations of copper carbonates are common. One of these at a depth of 225 ft. was crosscut for 30 ft., showing chalcopyrite and bornite disseminated in a hard greenish diorite which carried 1 to 3 per cent copper.

Dimensions and Area of the United States

The gross area of the United States is 3,026,789 square miles. The land area amounts to 2,973,774 square miles, and the water area—exclusive of the area in the Great Lakes, the Atlantic, the Pacific, and the Gulf of Mexico within the three-mile limit—amounts to 53,015 square miles. These and other data determined or compiled by the U. S. Geological Survey, to show the limits of the continental United States, contain some interesting facts.

The southernmost point of the mainland is Cape Sable, Fla., which is in latitude 25° 07′ and longitude 81° 05′. The extreme southern point of Texas is in latitude 25° 50′ and longitude 97° 24′. Cape Sable is therefore forty-nine miles farther south than the most southern point in Texas.

A small detached land area of northern Minnesota at longitude 95° 09′ extends northward to latitude 49° 23′.

The easternmost point of the United States is West Quoddy Head, near Eastport, Me., in longitude 66° 57′ and latitude 44° 49′; the westernmost point is Cape Alva, Wash., in latitude 48° 10′, which extends into the Pacific Ocean to longitude 124° 45′.

From the southernmost point in Texas due north to the forty-ninth parallel, the boundary between the United States and Canada, the distance is 1,598 miles. From West Quoddy Head due west to the Pacific Ocean the distance is 2,807 miles. The shortest distance from the Atlantic to the Pacific across the United States is between points near Charleston, S. C., and San Diego, Cal., and is 2,152 miles.

The length of the Canadian boundary line from the Atlantic to the Pacific is 3,898 miles. The length of the Mexican boundary from the Gulf to the Pacific is 1,744 miles. The length of the Atlantic coast line is 5,560 miles and that of the Pacific coast line is 2,730 miles. The Gulf of Mexico borders the United States for 3,640 miles.

Nearly all maps of the United States show the parallels of latitude as curved lines and are likely to lead the ordinary observer to believe that certain eastern or western states are farther north than some of the central states that are actually in the same latitude. For this reason, one who is asked which extends farther south, Florida or Texas, is very likely to say "Texas," but, as stated, the mainland of Florida is nearly fifty miles farther south than the southernmost point in Texas. For the same reason errors are likely to be made in estimating position or extent in longitude. Few realize that the island of Cuba, for example, if transposed directly north, would extend from New York City to Indiana, or that Havana is farther west than Cleveland, Ohio, or that the Panama Canal is due south of Pittsburgh, Pa., or that Nome, Alaska, is farther west than Hawaii.

Ontario's Metalliferous Production Increasing

Returns received by the Ontario Department of Mines for the six months ending June 30, 1920, are tabulated below, and for purposes of comparison the quantities and values are given for the corresponding period in 1919. Tons throughout are short tons of 2,000 lb.

Product	Quality 1920	Quality 1919	Value 1920	Value 1919
Gold, oz.	277,656	231,729	$5,690,504	$4,666,759
Silver, oz.	4,474,322	5,744,172	5,077,028	5,951,362
Platinum metals, oz.	184.45	30.08	12,443	1,805
Cobalt (metallic), lb.	113,239	59,337	266,045	93,157
Nickel (metallic) lb.	4,854,979	5,147,745	1,696,687	1,825,347
Nickel oxide, lb.	3,491,544	5,503	814,070	1,567
Cobalt oxide, lb.	388,318	202 912	645,783	301,791
Other cobalt compounds, lb.	1,417	26,289	1,029	16,164
Nickel sulphate and carbonate, lb.	159,183	133,732	15,308	15,531
Lead, pig, lb.	749,820	1,481,204	71,006	54,802
Copper sulphate, lb.	89,939	.....	4,497	.....
Copper, blister, lb.	2,918,153	3,080,492	470,949	452,055
Nickel in matte exported tons	9,527	7,072	5,338,120	3,535,915
Copper in matte exported (*a*) tons	4,434	4,341	1,241,520	1,128,753
Iron ore, exported (*b*) tons.	2,189	5,804	18,512	44,309
Iron, pig (*c*) tons.	28,771	24,095	738,079	670,512
Totals			22,101,580	18,759,829

(*a*) Copper in matte was valued at 13c. and nickel at 25c. per lb. in 1919. For 1920 the values have been placed at 14 and 28c. per lb. respectively. The total matte produced contained 15,030 tons of nickel and 7,705 tons of copper.

(*b*) Total shipments of iron ore were 13,962 short tons, worth $74,073.

(*c*) Total output of pig iron was 321,826 tons, valued at $8,255,916. Figures in the table represent proportional product from Ontario ore.

The aggregate output from metalliferous mines, smelters, and refining works of the Province of Ontario for the six months ended June 30 shows a considerable increase in value over the 1919 figures. For the first time since 1903, when the Cobalt silver camp was discovered, the output of gold exceeds that of silver in value. The new electrolytic refinery of the British America Nickel Corporation is now in operation at Deschenes, near Ottawa.

Japan's Mining Industry Slack

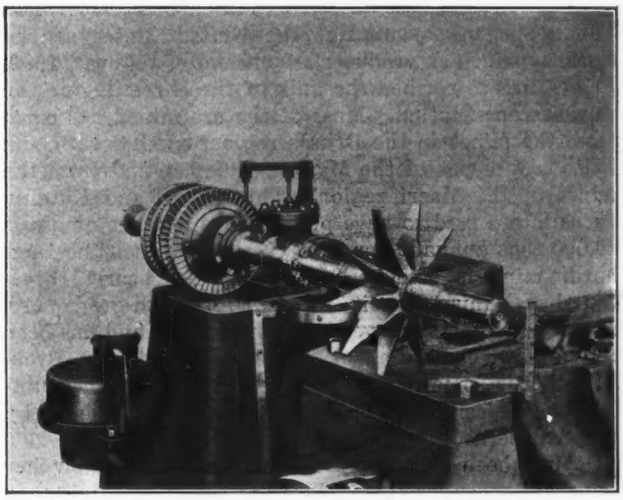
Japanese mining industry, in which more American capital is invested than in any other line of business activity in Chosen, experienced an unusual slackness during 1919. The Mitsubishi Iron Foundry, at Kyomipo, was forced to reduce its output, as was also the Suan mine, worked by the Seoul Mining Co., and the Kapsan copper mine, worked by the Kuhara Mining Co. The reasons for this were difficulties experienced in the matter of transportation through the outbreak of rinderpest among the cattle and which totally stopped all transport, and the heavy death rate among the miners from cholera. The continual rise in the cost of supplies and living expenses gave added cause for the reduced output.

A New High-Speed Turbo Compressor

Many Interesting Features in Machine Designed for an Argentine Copper Smelter—Notable Reduction in Manufacturing Cost of Air Compressors Possible—Low Capacity For Its Type and Wide Range of Volume

BY BANCROFT GORE
Written for *Engineering and Mining Journal*

IN NORTHWESTERN Argentina, on the eastern slope of the Andes, near Chilecito, at 5,500 ft. above sea level, the Corporacion Minera de Famatina operates a copper smelter. This plant has been recently overhauled and new equipment added to conform to the latest metallurgical practice. Two converters of the Peirce-Smith type are used for the production of blister copper from blast furnace and reverberatory matte.



ROTOR SHAFT OF TURBO COMPRESSOR

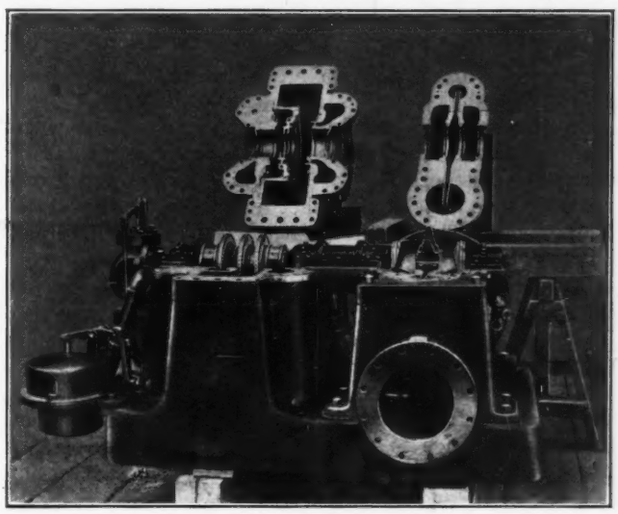
Air enters the tuyères at 12-lb. gage pressure, and the volume required fluctuates from 3,000 to 5,000 cu. ft. per min., according to variations in the operating conditions of the converter department.

As steam, at a pressure of 150 lb. with 100 deg. F. superheat, is available from waste-heat boilers, it was suggested that a turbine-driven blower would be the most desirable substitute for the belt-driven reciprocating unit, which was worn out and of insufficient capacity when both shells were blowing freely. Although the turbo blower, for capacities considerably in excess of these requirements, has generally supplanted cumbersome steam-driven reciprocating units, considerable difficulty was found in placing the order for the machine shown herewith. Owing to its relatively low capacity and the wide range of volume needed to meet the operating conditions it was the general opinion of engineers, all specialists in the design of air compressors, that the first cost of such a machine would be out of proportion to the many advantages easily obvious in the larger units, and that, in addition to its excessive steam consumption, it might result in an unfortunate experiment to the customer.

The design and construction of the machine were finally undertaken by the Rateau Battu Smoot Co. About the time the machine was set up for testing purposes at Ridgway, Pa., one of an almost continuous series of freight embargoes was effective, preventing shipment to the port of New York for export. Advantage was taken of this delay to give the compressor a rigid test, extending over a period of nearly two months. Mechanical engineers designing this class of equipment, who were invited to study the performance of the machine, were much interested.

A notable advance had been made in the construction of air compressors by an aggressive use of peripheral wheel speeds that in a unit of this size had been looked upon by conservative designers as either impossible or extremely risky for continuous operation. As a result of the somewhat unusual shaft velocity, which varies from 22,000 to 26,000 r.p.m., the cost of material used in the construction of the machine and the shop work had been cut to a pre-war basis, considering the capacity. A large proportion of the shop work was chargeable directly against the rotor element, which weighed only 138 lb. Further, it would be but one step more, by use of a two-stage effect on the air end of the rotor, to develop an air compressor for mining requirements that would be remarkable for compactness and weight when compared with a more conventionally designed machine of equivalent output.

In a general way this turbo compressor follows a design adopted in the construction of a blower which has been operating as a gas booster at Omaha, Neb.,



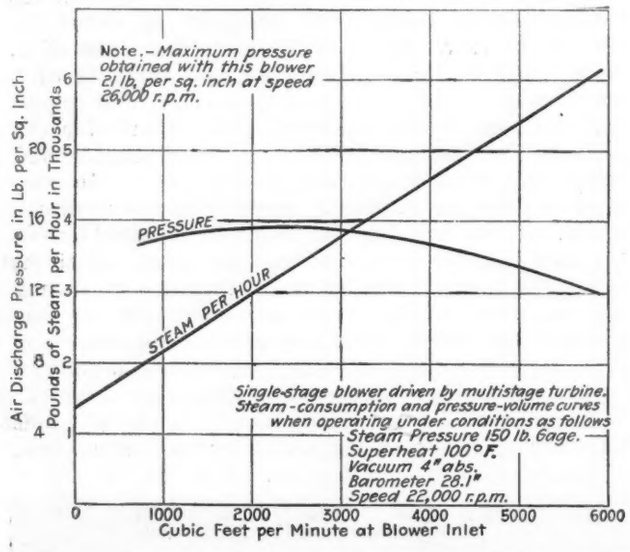
TURBO COMPRESSOR, SHOWING WHEEL CASINGS THROWN BACK

for two years at 20,000 r.p.m. The design of bearings for extreme velocities was much simpler than had been anticipated and the fool-proof qualities of a turbo blower were found actually to increase with the speed of the rotor.

The practical result of this experience applied with further refinements of design to the Famatina compressor is best known by comparison of it with a recip-

rocating machine of standard construction and approved type, rated at 4,000 cu.ft. per min. at 15-lb. gage pressure: Turbo compressor, selling price at factory, one-half; net weight, one-eighth; floor space occupied, one-seventh; concrete for foundations, one-fifth; railway and ocean freight to mine, one-seventh; erection cost, one-third. Aside from these features the blower has an efficient volumetric capacity of 25 per cent over and under its rating of 4,000 cu.ft. at 13-lb. gage pressure.

The general construction of the machine is shown in the accompanying views. The rotor is made of two rigidly coupled sections, forged and machined from nickel-chrome steel having an elastic limit of 80,000 lb. per sq.in. The turbine is of the Rateau two-stage impulse type, the first wheel taking the steam at initial pressure, from which it flows in parallel to each of the low-pressure wheels. The compressor is mounted directly over a Wheeler condenser, giving a vacuum of


Note.–Maximum pressure obtained with this blower 21 lb. per sq. inch at speed 26,000 r.p.m.
PRESSURE
STEAM PER HOUR
Single-stage blower driven by multistage turbine. Steam-consumption and pressure-volume curves when operating under conditions as follows
Steam Pressure 150 lb. Gage.
Superheat 100° F.
Vacuum 4" abs.
Barometer 28.1"
Speed 22,000 r.p.m.
Air Discharge Pressure in Lb. per Sq. Inch
Pounds of Steam per Hour in Thousands
Cubic Feet per Minute at Blower Inlet
0
1000
2000
3000
4000
5000
6000

STEAM CONSUMPTION AND PRESSURE-VOLUME CURVES

4 in. of mercury, absolute. One view shows the wheel casings thrown back, revealing the method of taking care of the smooth flow of air which enters and leaves the one-stage impeller chamber at a velocity above 1,200 ft. per sec. The bearings are ordinary babbitt-lined, but carry special groovings for the flow of lubricating oil, which circulates under a pressure of 10 lb. per sq. in. from an overhead tank at the rate of 8 gal. per min. This tank is kept overflowing, and an alarm attachment sounds when the oil supply to it fails.

At the maximum speed of 26,000 revolutions the operation of the machine is without vibration, owing in large measure to the satisfactory dynamic balance of the rotating element and the massive construction of the casing and bedplate.

The basic feature governing the smooth running of the compressor is that its critical speed is well above the running speed, in this case the critical speed being above 30,000 r.p.m.

The floor space occupied is 4 x 7 ft. and the height above floor level 4 ft.

Speed regulation is obtained by attaching to the end of the turbine shaft a small control fan, the air pressure from which is proportional to the square of the speed of the rotor. This operates a static regulator controlling the steam supply. Adjustment covers a considerable range of pressure and volume. An automatic stop valve, also controlled by the fan, shuts off all steam at the desired speed limit. A hydrostatic gage from the control fan indicates on a calibrated vertical scale the speed of shaft rotation.

The rate of steam consumption for a fixed speed of rotor, but with variations in the aperture of the air orifice, is shown in the graph in the opposite column. The comparative flatness of the curve between 3,000 and 5,000 cu.ft. shows the remarkable flexibility of the machine when it is operating under varying loads.

Chromite in Asia Minor

Chromite deposits are widely scattered through many parts of Asia Minor. All the orebodies are found in schistose and decomposed serpentine in groups of lens-like or irregular bodies.

The chromite mines of Asia Minor have produced important quantities of ore. From about 1870, when Turkey began to supplant the United States as the world's principal producer of chromite, to near 1900, Asia Minor furnished the bulk of the chromite for the world's consumption. Most of the ore mined has come from the mines in the Brussa region, on the south and southwest slopes of the Mysian Olympus, and from the mines of the Macri region. The Brussa and Kutahia deposits are said to have produced an average of about 20,000 tons annually for many years, of which the Daghardi mine is said to have furnished nearly three-fourths. This deposit consists of high-grade ore, averaging 51 to 55 per cent chromic oxide, and has been estimated to contain about 10,000,000 tons of ore. Probably this is somewhat an exaggeration, although doubtless the deposit is large and important if developed by modern methods.

It has been the policy of Turkey not to allow her mineral properties to fall into the hands of foreigners. Even while the exploitation of the chromite deposits was most vigorous, therefore, the mines, although in many places worked by foreign firms, were largely owned by the Turkish government or by Turkish subjects who leased them.*

French Iron-Ore Production

French production of iron ore during the first quarter of 1920, according to *Commerce Reports*, is given as 3,084,115 tons, by months as follows: January, 990,495 tons; February, 974,847 tons; March, 1,118,773 tons. Owing to the strikes in April the production fell to 613,028 tons.

There were imported into France during 1919 a total of 303,295 tons of iron ore, valued at 22,747,000f. ($3,116,027, at 7.20f. to the dollar, the average rate of exchange for the year).

Countries of origin and amounts were as follows: Belgium, 1,473 metric tons; Spain, 214,983; Italy, 9,113; Algeria, 10,398; other countries, 67,328.

The exports of iron ore during 1919 amounted to 1,697,171 metric tons, valued at 127,288,000f. ($17,436,712 at the above rate of exchange). The countries of destination are not given, but it is presumed that the majority of the iron ore exported went to Germany.

*E. C. Harder in "Political and Commercial Geology," McGraw-Hill Book Co., 1920.

A Picturesque Mining Experience—V.

The Last Bucket

By Lt.-Col. George Sydney Binckley

IT WAS a snowy day, a good many years ago, when I sat by a fireside up in Sutter Creek, and heard from Mr. Knight this story of the early days of quartz mining in California. We had been discussing a recent accident, and for a while the old gentleman pulled thoughtfully on his pipe.

"While it wasn't just the same kind of a mess, somehow that brings to my mind a curious thing that happened not far from here away back when I was a youngster," he began. "There had been some work done on the property a good while before—in fact, I believe that this was one of the first quartz mines in California—but it had been abandoned a long time before the new crowd came in, sank a vertical shaft a bit over in the hanging, and put in a steam hoist. The rock looked pretty good, and at the time I speak of they had the shaft down about four hundred feet, were drifting on the three hundred level in search of an orebody that showed in some of the old workings above, and had opened a small stope a short distance from the shaft above the four hundred level.

Caught by Poison Gas

"They were getting on pretty well but were bothered with poor ventilation, and I was over there putting in a ventilating fan and a small engine to drive it. They hadn't struck much water—an hour or so a day of bailing kept the sump clear—and, as I say, the main trouble was powder smoke. So that morning as I was rushing the work on the blower outfit over close to the shaft, I heard them shoot a round in the drift on the three hundred at the regular time. But even before the l st shot let go—I instinctively counted them—something ugly happened. There was a sudden roar of falling water in the shaft, and almost immediately there was belched up to the surface a sickening gust of foul gas. The effect was fairly stupefying. There was a sudden rush toward the shaft from all over the place, and as sudden a falling back as the foul, poisonous gas spread. For an instant no one could form any idea of what had happened, but it was plain that no man could be left alive in the mine."

The old man paused a moment, as the full recollection of that sudden horror came back to him. He spoke very slowly as he looked into the fire while the snow whirled outside. "I hardly know how to make you understand how I felt," he began. "In an instant all was quiet—the white-faced men who crowded around the shaft were as quiet as the timbered hills lying there in the sun. From the shaft we could hear the tinkle of a little stream of water that made deeper the silence of those who had died.

"And then the women came—there weren't many children yet—and at once came a clamor to go down and bring up the dead. Dazed as I was along with the rest, I kept my head enough to realize that it was death to go ten feet into that shaft, and I persuaded them to wait until I could get the blower to work and clear the shaft of foul air. Yes," remarked the old man with the ghost of a smile, "I persuaded them. I wore a six-shooter in those days, for it was a handy tool, and could save life as well as take it.

A Swift and Strange Death

"Well, it took but a short time to fix up the blower so it could run (fortunately the pipe was already in place), and soon after we started it up the air was clean enough to let the men go down to the three hundred and bring up those who had been working there. They found them in the little cross-cut where they had gone when they were ready to fire the round of shots that had broken through into a forgotten stope, hidden by an old, waste-covered bulkhead at the bottom of a winze from one of the old levels above. The bodies had not even been washed out by the rush of water as it swept past on its way to the shaft, but the foul gas from the rotting timbers killed all six as they stood. It was a swift and strange death.

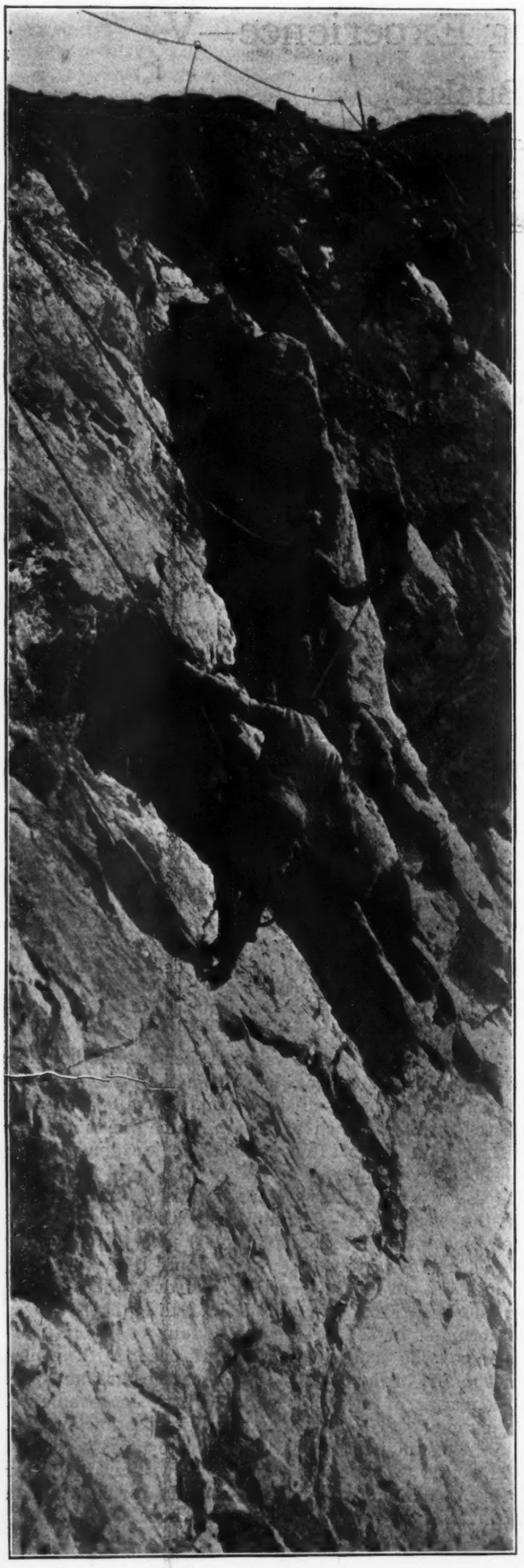
"There was a sad and quiet crowd around the collar of the shaft after the six bodies had been brought up and taken to the cabins, and we began to bail out the shaft so as to get at those caught by the water on the four hundred. It wasn't a long job, for there had not been any very great amount of water in the old stope, but it was coming on dusk when we got the water down toward the level, and we saw that soon we could send men down for the bodies there. Then the bailing bucket was lowered for the last time and allowed to fill."

The old man was staring into the fire. Then he looked up at me. "Can you see it? The dusky hills around, the silent white-faced crowd, the black mouth of the shaft? Can you realize the state of mind and body we were in after ten hours of desperate toil, and horror and nervous tension?

Miraculous Escape

"Try and see it all as it was, and then try and imagine the effect on that crowd when, from the bottom of the shaft, from the hands of dead men, slowly, solemnly as the tolling of the bell of Death, came the signal to hoist men! Stroke after slow stroke the gong in the hoist-house gave out the signal . . . . and the crowd melted away. Babbling terror, the Irish hoistman made for the woods, and—I admit it without shame—my knees shook under me as I took his place and brought the bucket to the surface. In the half-light, four men stepped off—to me it seemed in the dusk that I could see the headframe through their bodies, but I guess this couldn't be so, for they were four very solid Cornishmen, who had merely been trapped, with plenty of good air, in the overhand stope on the four hundred. As a matter of fact they suffered little inconvenience, and simply waded out when the water was low enough, climbed on the bucket, and signalled to hoist."

This was the tale told on that snowy day in Sutter Creek, and few stranger tales have I ever heard than this of the early days of the Mother Lode.



The Barman

By C. M. Campbell

THE accompanying pictures represent a phase of mining work of a somewhat more spectacular nature than usual. They show the removal of an unsafe piece of rock from the nearly vertical east wall of the glory hole at the Granby mines, at Phoenix, B. C., recently abandoned.

MORE difficult conditions prevailed underground. The physical character of the ore was such that shrinkage stopes were hardly ever necessary, the method actually employed involving large open stopes with the roof supported by pillars. The backs of these stopes had to be examined as the work progressed, and the lot of the barman who attended to this matter would not seem to be a happy one. There was, however, no lack of applications for these positions, and it is worthy of record that, during the twenty years the mines were operated, neither a fatality nor even a serious accident occurred among the barmen.

AS MAY be seen, each of the men makes use of a rope, one end of which is firmly fastened to a point above the work, the other being placed about the waist of the barman. Should he lose his footing he may be, for the moment, inconvenienced, but the rope is always the means of preventing a nasty fall and offers a safe method of carrying on the work of barring down.

Mining Men of Note

Adolph Lewisohn

FATE picked Butte as the scene of Adolph Lewisohn's entry fifty years ago into the business of mining copper, when, in 1870, the newly organized firm of Lewisohn Bros., of which he was a member, took over the property of the Montana Copper Co., controlled by Behr & Steiner, who had fallen into financial difficulties. Mr. Lewisohn, who was then only twenty-one years old, went to Butte to look over the new acquisition of his company. He found the superintendent pessimistic, and decided to have the mine examined. He chose for this work a distinguished engineer, whose report proved none too glowing. There was some copper, it stated, which perhaps it would pay to take out before shutting down. But operation was continued in the belief that the property had merit, which proved to be the fact, and eventually the Lewisohns organized the Boston & Montana Consolidated Copper Co. Later, when this company was taken over by Boston interests, Lewisohn Bros. contracted to refine and market its copper, and upon the organization of the Amalgamated converted this refining and selling business into the United Metals Selling Co., of which Adolph Lewisohn was president for a number of years.

ADOLPH LEWISOHN

As the original firm prospered it acquired other interests, among them being the Old Dominion, at Globe, Ariz., and the Tamarack and Isle Royale mines, in the Michigan Copper Country, which properties eventually were sold. At this time Lewisohn Bros. had two copper refineries, one at Pawtucket, R. I., and a small one in Connecticut. The growing demand for electrolytic copper caused the firm to build the Raritan Copper Works in 1898—a modern electrolytic refinery. About the same time the firm organized the Tennessee Copper Co., which continued under its management for the next decade. Adolph Lewisohn, however, withdrew from the firm within a few years and opened offices of his own, also continuing as head of the United Metals Selling Co. At present he is the head of Adolph Lewisohn & Sons.

In 1905, Mr. Lewisohn organized the General Development Co., which successfully floated the Miami Copper Co., of which he has been president from the start. The operating control of the Kerr Lake Mining Co., of Cobalt, was also purchased. In 1917, he again took control of the Tennessee Copper Co. and with others helped organize the present Tennessee Copper & Chemical Corporation. A few years ago, in association with the present firm of Lewisohn Bros., who are sons of the late Leonard Lewisohn, he formed the South American Gold & Platinum Co. Mr. Lewisohn's career has been distinguished by a capacity for business and a genius for organization that are apparent in all his achievements. But there is another side to his character that is quite as striking. He is widely known for his philanthropies, especially to a large part of the New York public. He is actively interested in many charitable and educational undertakings. Prominent among his gifts to various institutions is the building of the School of Mines of Columbia University; the great stadium of the City College, in New York, presented by him to the city, which turned it over to the college, and the building and equipment of the new pathological laboratory of the Mount Sinai Hospital in New York. Mr. Lewisohn is one of the reorganizers of the Hebrew Sheltering Guardian Orphan Asylum, to which he gave a large part of the financial needs for the building of its new cottage plan home in the country, where it takes care of dependent children in a model way. He is still president of this institution and is also honorary president of the Hebrew Technical School for Girls, which is doing a great work for the ideal education of girls after they leave the public schools. He is chairman of the Prison Survey Committee, appointed by Governor Smith, and of the National Committee on Prisons and Prison Labor, and has published an essay, "Prisoners: Some Observations of a Business Man." He is also a director in the National Child Labor Committee and the International Child Welfare League.

Mr. Lewisohn is now seventy-one years old, having been born in 1849 in Hamburg, Germany. His genius as an organizer, his example as a useful and honored citizen, and his benefactions as a philanthropist form a fitting memorial of his character and distinction.

By The Way*

Slippery Going

In protesting against the recent increase in freight rates, George D. Morris, manager of the Gila Copper Sulphide Co., at Christmas, Ariz., said that his company "had one foot in the grave and the other on a banana peel." Probably a sliding scale based on market conditions would be more suited to a company in this condition.

Not a Vegetarian

"They do say as 'ow tha price o' food stuffs be droppin'," sez Cap'n Dick, "an', dam-me, I mus' say as 'ow tha news be pleasin' to some. 'Ere a bit ago some o' tha men wuz grumblin' baout 'ow everythin' wuz so 'igh an' any nummer o' schemes were tried h'out to h'economize. Some worked an' some didn't. Jan Tregar's missus tried somethin' on 'im that didn't gaw very well with Jan. One moornin' 'e starts for tha mine, an', dam-me, 'e wuz feelin' pretty good, for 'e naws 'e 'ad a bit o' pasty in 'is dinner bucket. Come along h'eatin' time, an' Jan sits daown to 'ave a bite. H'after 'e'd taken a few bites o' 'is pasty 'e naws somethin' is wrong, for, dam-me, tha pasty doesn't taste right some'ow. An' before 'e's through 'e naws bloody well tha missus 'as lef' h'out tha meat. So 'e wuz mad, an' that night tha firs' thing 'e says to 'is missus, ''Ere, Mary Jane; w'ot's, tha matter with my pasty?' 'W'y, Jan,' sez she, 'w'ot's that matter with un?' 'Well,' sez Jan, 'thee need'nt think thee can make any bloody root-'ouse out o' my stummick. Nex' time, min' you, I want some meat in my pasty.'"

Science and Health

A certain American mining engineer has resided so long in the Republic of Colombia that the natives regard him almost as one of the family. Not long ago while domesticating after a particularly strenuous experience in the field, he felt indisposed to the point of craving a little sympathy. As his wife strove to entertain some callers, the afflicted one reclined in an easy chair and from time to time passed his hand across his brow, muttering *"Aaaie! Aaaie de mi. Aaa---ie!" in the* characteristic manner of Latin-Americans. The clacking of tongues became somewhat hushed; giving way to murmers of pity and promises to the hostess of various home remedies to be dispatched by couriers at the earliest moment. After the room had cleared, the patient's faint self-congratulatory grin faded as Mrs. Gringo turned on him with a playful tirade. "Now, see here, Enrique. I think a good bath and a shave will make you feel all right in *poco tiempo*. I know there is nothing much the matter with you at all. I know it pos-i-tive-ly, because never, never in the world was there anyone really sick who would groan in a foreign language."

EDITORIAL NOTE*

This page is not to be taken seriously. If our attempts at occasional humor are not detected as such, we at least wish to disclaim all responsibility. Our chronicling in a recent issue of the new German scheme for extracting gold from sea water has brought us in an honest offer to raise money for subscriptions. We have thought of labeling each of our whimsical paragraphs "Joke," but have concluded that perhaps a general notice will serve.

Early Operations in Arizona

"Of mining operations in Arizona, during any portion of the Spanish or Mexican period, nothing is practically or definitely known," says H. H. Bancroft in his History of Arizona. "The records are barely sufficient to show that a few mines were worked and that the country was believed to be rich in silver and gold. In several districts have been found traces of these early workings; and these with traditions arising from the Planchas de Plata find, at Arizona proper just south of the line, are for the most part the only foundation for the many lost mines of which much has been vaguely written and more said. I have already remarked that modern writers have greatly exaggerated the country's former prosperity in mining and other industries, and it may be added that they have as a rule given the wrong date to such prosperity as did exist, by assigning it to the earlier years of the Jesuit period. Contrary to what has been a somewhat prevalent impression, there are no clear indications of prehistoric mining, that is, by the Pueblo Indians, when their towns extended over a large part of the territory; and there is no proof either that the Jesuits ever worked any mines, or that in their time there were ever carried on any mining operations except on a very limited scale near the Tubac presidio, though in occasional prospecting tours it is probable that some discoveries were made. In Franciscan times for over two decades the same state of things continued. But from 1790 for twenty or thirty years, the period of comparative peace with the Apaches, the veritable era of Arizona's early prosperity, there can be no doubt that many mines were opened from time to time and that some were profitably worked, though we have no definite record of particulars, and though there is no reason to believe that there were any very extensive or wonderfully rich developments. It is to this period almost exclusively that we must trace the old workings discovered in later years, and also all the traditions of lost mines that have any other than a purely imaginary foundation."

The Peanut Press Replies

As we believe in letting both sides of a question be heard, or as many sides as the question may have, we reprint the following letter, which has been received from an observing reader.

Greeting:

In your Aug. 28 issue I had occasion to observe two important items that should have had additional publicity in your following issue. One item referred to the possibility of raising snakes in Arizona for commercial possibilities and the other article states that the blow-off that hatches and breeds in the unworked or closed mines is a menace to cattlemen of southeastern Arizona. For the benefit of all concerned it should be remembered that since prohibition was cast upon us snakes are becoming prominent and more numerous, hence the commercial possibility of a byproduct in the reptile. Also be it further resolved, that if those cattlemen who are also bankers in Arizona would invest a nickel in legitimate mining once in a while, especially in their own country, the blow-fly would soon blow away, or else get run over with an ore car at a producing operating mine. No—the cattleman will come to the city after he has cleaned up about $50,000 on a roundup, and will let some one clean him up. Then he goes back home and discovers that some of his bulls got killed by a blow-fly—then the big yell "Close the mines tighter!" Let us have a little yelling about opening them up. "What do you say, boys?"

Yours sincerely,

"PEANUT PRESS."

CONSULTATION

A Prospective Mining Career

"I am a young man seventeen years old, having had only a grammar-school education, and from since I could remember I always wanted to be a mining engineer, but do not know how to go about it; so will you help me by answering the following questions:

"1. I haven't the time to go to college to learn mining engineering, as I have got to work. Do you think I could learn mining engineering through a correspondence course?

"2. Must one pass a state examination to become an engineer?

"3. Will there be a great demand for mining engineers in the next twenty-five years or so?

"4. How much do prospectors and assayers get as a yearly salary?

"5. What must one know to become a prospector and assayer, and what are the necessary qualifications?

"6. Do you think I could learn mining engineering by working in a mining engineer's office, at the same time taking a course in the same?"

The *Engineering and Mining Journal* frequently is called upon to essay the difficult and responsible task of advising young men about to embark upon the career of mining engineer as to their prospects in the profession and concerning the kind of education best suited to their needs.

In this case it will be difficult for the inquirer to enter a mining school, owing to his probable inability to pass the entrance examinations on merely a grammar-school knowledge. Supplementary study will be necessary before the usual rigid requirements of the various universities can be met. There is a choice of studying in spare time, with the object of ultimately entering some mining school or starting a career in the mines immediately, and supplementing the direct experience gained with correspondence-course studies or otherwise, and depending upon sheer determination and ability to succeed. In view of your youth, you can well afford time and mental effort in an attempt to pass the college entrance requirements. Such an effort will be found to pay in any future work. Although many men have become eminent and highly successful mining engineers without a degree attached to their names, the fundamental knowledge acquired through mining-school study cannot be deprecated. Many young men have worked their way through college and benefited by the necessity.

To answer the questions in detail:

1. Mining engineering undoubtedly can be taught through a correspondence course, but a regular program of studies pursued at a recognized mining school, with actual instructural contact, is much more to be desired. If you have time and money to devote to a correspondence course you should be able to find time for a more extended regular curriculum.

2. A few states, such as Oregon and Colorado, require a state examination and license for practicing mining engineers.

3. It is difficult to prophesy the demand for any particular professional service, but as long as the world needs metals and minerals there will be an insistent call for mining talent.

4. Prospectors as a rule do not work on a salary basis but prospect for themselves. In some cases they are "grub-staked"—that is, in return for their "grub" they agree to allow a certain party or parties a portion of their discoveries. Assayers get variable salaries. We note a call for some at $150 per month and others for less. It depends on conditions and circumstances.

5. To learn either prospecting or assaying exclusively, a university education is not essential—both can be readily grasped by practice and a little study.

6. It would be of substantial aid in this case to work in a mining engineer's office, but unless the work were supported by actual field practice it would not be of great benefit.

The following list of books and papers has been compiled by Engineering Council in response to requests, especially from parents and vocational advisers of high-school boys, for information concerning the principal branches of engineering, the education and training requisite therefor, and the possibilities for making a livelihood therein. It is valuable to anyone contemplating an engineering career:

"Engineering as a Career." Edited by F. H. Newell and C. E. Drayer. D. Van Nostrand Co., 1916. A collection of papers originally published in the *Cleveland Plain Dealer* and the *Scientific American* on various phases of engineering work.

"Opportunities in Engineering." By Charles M. Horton. Harper & Bros., 1920.

"Engineering as a Vocation." By Ernest McCullough. David Williams Co., 1911. Subject matter based upon a series of addresses given before technical schools and associations of engineer assistants. Published for information of parents.

"Engineering as a Career." By Percival and A. A. Marshall. P. Marshall & Co., London, 1916.

"Addresses to Engineering Students." Edited and published by Waddell & Harrington, consulting engineers, Kansas City, Mo. Second edition, 1912. The purpose of the book is to give engineering students a broad conception of the profession.

"Engineering as a Profession." By Milo S. Ketchum. Bulletin of the University of Colorado, 1916; No. 6. General Series No. 98.

"Engineering as a Profession." By Dean William G. Raymond, University of Iowa. University Extension Bulletin No. 3. New Series No. 73. April 11, 1914.

Manganiferous Zinc Residuum

"Will you kindly tell me where and how much manganiferous zinc residuum was produced in the United States during 1919?"

According to the U. S. Geological Survey, there was produced 80,418 long tons of manganiferous zinc residuum in 1919, compared with 146,796 long tons in 1918, which came from Franklin Furnace, N. J., and was made by reducing the complex manganese-zinc mineral franklinite, occurring in the district. A mechanically and electrostatically separated franklinite product is roasted with anthracite to eliminate the zinc, and the residue, containing about 15 per cent manganese and 40 per cent iron, is smelted to spiegeleisen.

THE PETROLEUM INDUSTRY

The Petroleum Industry in Mexico

Numerous Factors Have Retarded the Full Development of Oil Possibilities—Exports for the First Half of 1920 Show an Increase, and Extensive Exploration Is Now Being Done*

A COMPARISON of figures on the production of oil in Mexico, in the United States, and in the world since 1912 shows that the Mexican production has multiplied more than three times in the last seven years. Though in 1913 Mexico supplied only one-fifteenth of the world's production of oil, in 1918 it furnished more than one-eighth.

Statistics show that the world's actual production of oil in 1918 was about 515,000,000 bbl. The potential production of Mexico during 1919 was 547,000,000 bbl. By the term "potential production" is meant the amount of oil that would be produced if each well were permitted to flow without any restraint being placed on it. In 1919 Mexico was potentially able to produce 32,000,000 bbl. more oil than was actually produced in all other countries in 1918, and 170,000,000 bbl. more than the United States production of 377,000,000 bbl. in 1919. The potential production of the wells already drilled and producing in Mexico is estimated at from 1,500,000 to 1,900,000 bbl. daily. But only about 12 per cent of the potential capacity of the wells in Mexico is being actually produced. The full development of the potential possibilities of the industry in Mexico has been hindered by the lack of transportation both for oil and materials, by the lack of sufficient storage facilities, and by the disorganized political conditions of the country. The application of new legislation to the industry, the effect of which it has not been possible to fully ascertain at this time, has tended to halt development operations. Yet the exports of oil from Mexico in the first half of 1920 show a notable increase over the shipments in previous years.

COMPARISON OF MEXICAN AND AMERICAN WELLS

The output of the wells in Mexico can best be illustrated by a comparison with the wells in the United States. The oldest wells in this country are in the Appalachian region and number about 100,000, with an average daily yield of less than two-thirds barrel per well. The newest region is the Rocky Mountain, with 400 wells and an average per well of 40 bbl. daily. The Mid-Continent field of America, with nearly 50,000 wells, averages 9 bbl. daily. The California field, with an annual production of about 100,000,000 bbl., yields an average of 30 bbl. daily per well.

The known oil-producing areas of Mexico may be divided into three main regions, as follows:

The Tampico Region.—The Ebano field is situated forty miles west of Tampico. The oil from this field has a very heavy percentage of asphaltum, and averages about 12 deg. Bé. (0.986 specific gravity). The Panuco field, comprising the productive areas between the Tamesi and Panuco Rivers, is twenty to thirty miles southwest of Tampico. The Panuco or Topila product is a heavy, viscous oil of from 10 to 15 deg. Bé. This field is noted for relatively few failures in drilling. The Huasteca field is south of Tampico and north of the Tuxpam River. This is a field of big producing areas, such as Casiano, Cerro Azul, and Potrero del Llano. The oil is lighter than the Ebano and Panuco grades, averaging from 19 to 21 deg. Bé. (0.9395 to 0.9271 specific gravity).

The Tuxpam Region.—The Tuxpam field is situated south of the river of the same name. The oil is lighter than in the regions farther north, being 19 to 22 deg. Bé. The wells are characterized by long periods of productivity. The Furbero field is about forty miles southwest of Tuxpam. The oil is 24 deg. Bé., but the yield has not been large, and the field is not now producing.

The Tehuantepec-Tabasco Region.—The Tabasco-Chiapas field is noted for the quality of its oil, which has a paraffin base, is very light, and contains a large proportion of illuminating oils. Exploitation of this field has not been active since 1917.

Isthmus of Tehuantepec field produces an oil of from 25 to 32 deg. Bé. The field is characterized by the short period of productivity of the wells and the shallow depth to oil. Operations in this field have not been of great importance in the last few years.

The temperature of the oil as it comes from the various wells in Mexico ranges from 105 deg. F. at Ebano to 165 deg. F. in the water and oil of the Dos Bocas. The pressure per square inch varies from 285 lb. in the Casiano well to 850 lb. in the Potrero gusher.

HISTORY OF MEXICAN OIL DEVELOPMENT

The earliest reference to oil as an industry in Mexico occurs in pamphlets issued in 1857, which record the agreement of a group of merchants in the village of Macuspana, Tabasco, to furnish cacao in exchange for "sheets of forged iron" to be used in storing "illuminating oil" which flowed from a spring near the village. In 1865 the government issued a permit authorizing a certain Spaniard to exploit the deposits of bituminous and oleous substances near San Jose de las Rusias, Tamaulipas. The favorable results obtained by this Spaniard led to the organization of the Development Co. of the Gulf of Mexico in 1868 by a group of Mexican planters for the purpose of exploiting the petroleum seepages and springs situated near Furbero, Papantla, Vera Cruz. This company failed because of financial difficulties. An attempt by Dr. Autrey to continue the development of this field in 1878 was unsuccessful also.

The failure of all these enterprises and those

*Abstract from Latin American Circular No. 74, prepared by the Bureau of Foreign and Domestic Commerce.

immediately following produced a period of pessimism regarding the oil industry in Mexico lasting until about 1900. In that year American oil men, headed by E. L. Doheny and C. A. Canfield, purchased some land at a place now called Ebano, in San Luis Potosi, near the Vera Cruz boundary. In the spring of 1901 a camp was established and drilling began on the first of May. In just two weeks the first profitable well was developed, although its yield was only 50 bbl. a day. There followed three years of continuous and fairly successful drilling by this company, under the name of the Mexican Petroleum Co. A so-called "gusher," yielding 1,500 bbl. daily, was brought in on April 6, 1904, and this well is still flowing at the present time, production being about 800 bbl. daily. The total production of oil in Mexico in the first year of success—1904—was 220,000 bbl.

Early American and British Oil Investors

The development work of the Mexican Petroleum Co. proved so successful that a policy of expansion and exploration was adopted. In 1906 the company acquired several tracts of land situated from 60 to 100 miles south of Tampico. The two English companies holding part of the tracts had failed to discover oil in paying quantities. In July, 1910, a 14,000-bbl. well was brought in by the Mexican Petroleum Co., and the production of oil on a large scale was begun in Mexico. Exports of oil from that country began in 1911.

Soon after Doheny began his operation in the Ebano region an English company, S. Pearson & Son, Ltd., started exploitation on the isthmus of Tehuantepec, and in 1906 extended its activities to the fields south of Tampico. The first well on the isthmus was brought in in 1904, and in 1910 the famous Potrero del Llano was developed in the Huasteca field. This well had a possible daily production of 100,000 bbl. when brought in, and flowed until December, 1918, when it went to salt water. In 1906 S. Pearson & Son, Ltd., contracted with the Mexican government to exploit government lands in the states of Chiapas, Campeche, Vera Cruz, Tabasco, Tamaulipas, and San Luis Potosi. This company has continued to acquire oil lands in Mexico.

Explorations for New Fields of Production

Increasing attention is now being given to the exploration of various other parts of the republic for the discovery of oil. A recent report of the Mexican Petroleum Department, of the Department of Commerce, Industry, and Labor, Mexico City, places the zone of possible production in the Gulf Coast States at over 80,000,000 acres, on the Pacific at about 50,000,000 acres, and in Lower California at about 18,000,000 acres, a total of 148,000,000 acres, or 230,000 square miles. Of this immense area only about 6,500,000 acres have been investigated, which illustrates the scope offered for wildcat operations in Mexico. The combined area of the fields now being exploited in Mexico does not exceed 800 square miles.

The discovery of what is believed to be extensive petroleum deposits on some islands in the Gulf of California has been officially announced by the Mexican government. These islands are close to the shore of Sinaloa, due west of Hermosilla, and the deposit is said to extend to the mainland on the peninsula of Lower California. The southern district of this peninsula has given indications of an extensive petroleum zone, and it is being thoroughly explored.

Exploration is also being carried on in different parts of Mexico, as follows: Durango, in the neighborhood of Mapimi; Colima, in the vicinity of Santa Rosalia and of Manzanillo; Chihuahua, in the vicinity of Casas Grandes, Guzman, Trinidad, Santa Maria, southeast of Ojinaga, and near Juarez; Coahuila, at Ubalde, near Piedras Negras, and at Nuevo Laredo; Chiapas, in the departments of Palenque and Mezcalapa; San Luis Potosi, in the Valles district; Jalisco, vicinity of Lake Chapala; and in various parts of Yucatan.

Ownership of Mexican Wells

Of the total investments in the oil industry of Mexico 97 per cent is held by foreigners. In the petroleum industry of the United States but 4 per cent of the total amount invested is held by foreign capital. In 1918 there were twenty-seven companies in Mexico which produced oil in commercial quantities, seventeen of these being owned by Americans, five by Spanish-Mexican capital, three by Dutch, and two by British interests. Of the total of 63,828,326 bbl. produced in Mexico in 1918, the American interests produced 73 per cent, British 21 per cent, Holland 4 per cent, and Spanish-Mexican 2 per cent. In 1919, however, the British interest materially increased their production. Only American and British interests shipped oil from Mexico during 1918, the oil exports having been 79 per cent American and 21 per cent British.

The refining plants in operation at the present time consist of four in Tampico, one in Tuxpam, one in Vera Cruz, and the oldest one of all in Minatitlan. These refineries have a total capacity of approximately 100,000 bbl. daily. Not more than 22 per cent of the oil exported from Mexico is sent out in the refined state. The future will probably witness the establishment of several new plants of large capacity.

The exports of oil from Mexico in the first six months of the calendar year 1920 amounted to nearly 60,000,000 bbl., representing an increase of 72 per cent over the exports in 1919. If this rate of increase is maintained throughout the year, the total exports for 1920 will reach 135,000,000 bbl., in comparison with 78,000,000 bbl. in 1919.

Destination of Mexican Oil

Of the total exports in June, 1920, the shipments from the Tampico district amounted to 10,566,181 bbl. From Puerto Lobos the shipments were 3,384,513 bbl., and from Tuxpam 1,472,553 bbl. The United States took 71 per cent of the total, South America 8 per cent, Great Britain 4 per cent, Cuba 3 per cent, and Mexico itself 4 per cent, the small remainder going to various countries of North America and Europe. In accordance with its usual record the Huasteca Petroleum Co. was the largest shipper, its exports for the month of June totaling 2,189,750 bbl. Production was somewhat curtailed in June by floods in the lower country, which damaged the oil fields.

The total imports of oil from Mexico into the United States in the fiscal year ended June 30, 1920, reached the record figure of 2,821,693,174 gal., or 67,183,170 bbl. (at 42 gal. to the barrel). This shows a gain of 991,598,069 gal., or 23,609,478 bbl., over the imports of the 1919 fiscal year, which amounted to 1,930,095,105 gal., or 45,954,645 bbl. The gain was 100 per cent over the imports of 1918, when the imports were somewhat more than 1,000,000,000 gal.

NEWS FROM THE OIL FIELDS

Recent Rains in Texas Fields Cause Production Decline

From Our Special Correspondent

In the North and North Central oil fields a considerable decrease in production was recently evident. This was due largely to interference with development work by recent heavy rains. Production changes in these fields lag only slightly behind changes in development. The fields principally affected were Burkburnett, those of Stephens County, and Desdemona, in Eastland County. The Eastland-Ranger district of Eastland County made an increase in production over the preceding week. In and around Burkburnett a number of wells were completed, but all of them were small producers, and their combined production was not sufficient to offset the natural decline in the older wells.

It is reported that Walker & Perkins have sold a 40-acre lease out of the Goodwin tract, one and one-half miles northeast of Breckenridge, for approximately $1,500,000. This lease includes one producing well that came in two months ago making 5,000 bbl. of oil daily. Completions have been made in the Breckenridge Townsite field by the Virginia Oil Co., Ibex Oil Co., Plateau Oil Co., and others, all of these companies bringing in good producers. In some cases the wells were brought in after shooting. Acreage in the northern part of Stephens County in the vicinity of the Leydon field is being leased for as high as $1,000 per acre in some cases.

The Killeen-Mellon well in Bell County is reported to have struck oil and gas in the black lime below 1,850 ft. This is in wildcat territory, and any discovery here will be of considerable importance.

In the Gulf Coastal section the Hull field made the largest increase in production during the week ended Sept. 25, reaching about 18,000 bbl. per day. The Republic Production worked over its No. 20 Dolbear, getting a flow of 4,000 bbl., and completed Nos. 37 and 40 Dolbear, which made initial productions of 1,500 and 350 bbl. respectively. These are all in the 800-acre Dolbear tract. The joint well of the Sun and Texas companies was drilled to 4,070 ft. and then pulled back and casing set from 3,570 to 3,680 ft. The flow gave 300 to 400 bbl. oil and 1,200 to 1,500 bbl. salt water. This is one of the deepest wells in the field and the most southerly.

Interest at West Columbia still centers on the No. 1 Abrams well of the Texas Co. which continues to flow 7,000 bbl. through the drill steam. Three wells immediately north of this well are now down below the depth of the Abrams No. 1 without results. These are the Monarch Oil & Refining-Stribling well, over 3,280 ft., No. 1 Masterson of the Gulf Production Co., over 3,200 ft., and the No. 1 Robinson of the Humble Oil & Refining Co., 2,900 ft. plus. Production from the West Columbia field was over 20,000 bbl. daily during the week ended Sept. 25. The Humble Oil & Refining Co. completed its No. 28 Japhet well at West Columbia recently. The next morning it was flowing at the rate of 15,000 bbl. daily or better. This well is a little less than 3,400 ft. deep, and is on the northeast corner of the Japhet lease.

An interesting deep test was made in the Goose Creek field by the E. F. Simms Co. in its No. 33 Ashbel Smith well which was deepened and tested below 4,000 ft. Considerable gas was obtained and an oil spray. This is the deepest hole in the field. Goose Creek is one of the few sections in the Gulf Coast country believed to be salt domes where salt has not yet been found.

New Well in Mule Creek Field

From Our Special Correspondent

The Western States Oil & Land Co. completed a well in the Mule Creek Field recently, making the third producing well completed during September. Other wells are being drilled in this section. This company also brought in a 350-bbl. well in the Salt Creek field a short time ago.

It is reported that oil has been struck at 400 ft. in a wildcat well being drilled on the Ziller ranch near Cumberland, Lincoln County, by Oregon men. The oil is said to be of high grade.

The Standard and Midwest refineries at Casper will be supplied with gas for fuel as soon as the 12-in. main can be laid across the Platte River and connections made. The gas will supplant the oil now being burned.

The Sunset Oil & Land Co., it is reported, has struck oil at 3,700 ft. in its well on Sect. 6 of the Lance Creek field. This well is a considerable distance southwest of any previous drilling.

In this same field, the Western States well on Sec. 28, on the far east side of the field, tried to change itself from a pumper to a gusher; two high heads of oil were made on successive days.

The Producers & Refiners Corporation has struck oil in its No. 2 well in the Osage field at 1,500 ft. The well will be drilled in deeper and placed on the pump. This well is 2,000 ft. southeast of the company's No. 1 well. This company is also drilling a wildcat well in the Williams Park district, near Hayden, Routt County, Colorado. The first casing has been set.

Activities in the Tampico Region

From Our Special Correspondent

The damage done by the fire which threatened the Cia Mexicana de Petroleo, "El Aguila," refinery is now estimated at nearly one million dollars. There were five 55,000-bbl. storage tanks, and a 2,000,000-bbl. reservoir of asphalt destroyed before the flames were extinguished. The fire started early Monday morning, September 13, one of the tanks being struck by lightning, and was not controlled until Tuesday evening after the hardest kind of fire fighting. No foamite or steam was available. The entire tank farm and refinery were in serious danger for several hours, as there were a number of gasoline tanks within a hundred yards or so of the flames.

The Aguila company recently brought in another big well in the Los Naranjos field on Lot 134 Chinampa. It was controlled in six and one-half minutes. The well is estimated at 60,000 bbl. daily.

There are several new holes being put down on lot 114 Chinampa and there is a great deal of interest in the drilling to see who gets to the pay first. There are already six producing wells on this lot varying from 20,000 to 50,000 bbl. daily.

The tests in Zacamixtle are being closely watched by many, as some of them are starting to look doubtful. This field was reported on by geologists, and is on line between the Amatlan-Chinampa field and the Cero Azul pool.

Deep Pool To Be Tested in Warren County, Ky.

From Our Special Correspondent

Geologists who have conducted a two months' investigation of deep strata in Warren County report that a deep pool lies there which operators will test out soon. A dual structure is said to underlie the field, indicating that a well touching this level will quadruple the present average production per well and will show a depth of sand twice as great as in the present shallow depths. The intersection of the dual structure occurs at Sand Hill and extends two and one-quarter miles in all directions.

The Callis Oil Syndicate brought in a 50-bbl. well Sept. 29 on the George Sledge lease in Warren County. No. 2, on the Jackson lease, one mile south of Bowling Green, has been brought in, pumping 20 to 30 bbl. a day. Both No. 1 and 2 on this lease indicate that they are on the edge of a pool above the shale. Several deep wells will be drilled.

Kerstedder brought in a well Sept. 27 on the Briggs lease, five miles west of Bowling Green, estimated at 25 bbl.

Denver Convention of Independent Oil Men Draws Large Number

Jobbers, Refiners and Supply Men as Well as Producers Discuss Papers Presented--Van. H. Manning's Address a Feature—Many Companies Have Part in Exhibit—Story of Petroleum Shown in Films

BY GEORGE J. YOUNG

THE term "oil man" is as inclusive as the term "mining man." However, it has the significance, when used by the Independent Oil Men's Association, which held its convention in Denver, Col., from Sept. 28 to Oct. 1, that it excludes all companies which are affiliated in any way with the Standard Oil group and includes in its membership companies, that are essentially jobbers, refiners, and supply men. Indirectly producers and the petroleum industry generally are interested in this association because it has to do with the marketing and handling of petroleum and its products. The membership of the association consists of 300 companies. T. J. Gay, of the Gay Oil Co., of Little Rock, Ark., is president.

The organization is not a militant one in so far as the Standard Oil group is concerned. On the contrary, it co-operates with this group in many ways that are important to the welfare of the petroleum industry. Its chief purpose is to fight improper trade standards, improper competition and to advance the interests of both producers and marketers of petroleum products as well as the industry generally.

By the evening of Sept. 27 the badges of the association became conspicuous in numbers. The way the convention opened might be compared with the bringing in of an oil well. First, a rush of water, and then gas, and finally the oil spouts. Although from the announcements in the program the subject of oil was expected to be reached on the first day, the important speakers, Governor S. Bamberger of Utah and Dr. Cottrell of Washington, did not arrive and substitutes took their place. At the luncheon President Gay presided and introduced Governor Oliver H. Shoup of Colorado and D. C. Bailey, mayor of Denver, who welcomed the delegates to Denver. At the conclusion of the addresses all adjourned to the Auditorium, where an interesting exhibit of marketing appliances, motor trucks, tanks, metal hose, pumps and oil-testing apparatus was on display.

The afternoon session was held in the Auditorium, with President Gay in the chair. E. R. Harper, former lieutenant-governor of Colorado, was the first speaker. He discussed the potential resources of Colorado in the large deposits of oil shale and pointed out in an emphatic way the need for almost unlimited capital to carry the oil shale possibilities to commercial success. In closing he briefly touched upon the subject of unfair freight rates, which, in his opinion, discriminated against the users of petroleum products in Colorado. Harry S. Botsford, manager of the Puente Oil Co., of Los Angeles, Cal., was the next speaker. His address was on the subject of the vital need of better American citizenship.

Fred W. Freeman, president of the Elk Basin Consolidated Petroleum Co., then spoke. He said: "The oil business is a wonderful business. This is principally on account of the number of 'experts.' It's the only business that can register 100 per cent. I can prove that there never was a dry well in the United States. It is the tradition of success that lingers around an abandoned well or else the story of the Standard Oil buying up the well and closing it down just when it was ready to produce that proves my assertion. Once I drilled two wells, prospects. One developed a little gas and the next one was a beautiful salt water artesian well. Some years later I was in the same locality and found that attempts were being made to develop oil on the strength of a report that the wells I drilled had been purchased and closed down by a large oil company." He closed his address by calling attention to the large number of grafters afflicting the oil industry and said that it is the duty of the association to put the stamp of disapproval upon the men who exploit the people in the name of the industry.

"FORTY-NINE" ENTERTAINMENT ARRANGED FOR DELEGATES

The entertainment of the evening of Sept. 28 was a "humdinger." Whoever had the arrangements in charge was an expert in human psychology and particularly the psychology of oil men. It was called a "forty-nine" evening. The cathedral room of the Albany Hotel was the stage and all who attended were participants. Of course there was a little outside talent from the "Midnight Follies." There was something doing every minute from the time each eager delegate tied his red bandana about his neck and grasped his corncob pipe, handed to him as he entered, until he cut his way through the smoke-laden air to the door on his way to his hotel. Probably none thought of what an old "forty-niner miner" would have thought if he had had the good fortune to have been present, but we can picture his amazement and we know that, if he retained any power of speech, he would be just able to say "some night, oh boy!"

Wednesday opened up another fair day and the convention began to get down to business. President Gay introduced T. F. Kuper, of Chicago, secretary and treasurer of the Mideo Oil Sales Co., who made an eloquent plea for the establishment of a workable code of ethics for jobbers and refiners. He offered a resolution to the effect that the association appoint a committee to confer with the various divisions of the oil industry and work out a suitable code for adoption by the association.

In the discussion that followed W. F. Farish, of Chicago, called attention to the work already done and in progress by the American Society of Testing Materials. Mr. Kuper in reply stated that the association's committee would work in harmony with the society.

O. W. L. Coffin, of the White Co., Cleveland, Ohio, the next speaker, presented the subject of "Motor Truck Supervision, Lubrication and Maintenance." He went to the heart of the problem by stating that the selection of proper equipment was fundamental and that next was the human element. Good supervision in handling both men and trucks intelligently reduced maintenance. Lastly lubrication conscientiously carried out and controlled by inspection is the remaining factor necessary to keep maintenance at a minimum. W. F. Parish read a carefully prepared paper on the subject of "Specifications and Nomenclature of Lubricating Oils." Colonel H. C. Boyden, of Chicago, closed the morning's program with the subject of "Concrete Tanks for Oil Storage." He pointed out the wide use of such tanks in the California oil fields and the advantages of their use in other oil districts.

BUREAU'S PETROLEUM FILMS SHOWN

In the afternoon the long delayed moving pictures of the Story of Petroleum, a film made by the U. S. Bureau of Mines in co-operation with the Sinclair Oil Co., were shown. These were elementary in nature but gave the general public an excellent idea of the great divisions of the industry and some of the important details. E. E. Grant, secretary and treasurer of the association, presided and introduced L. F. Moore, traffic manager of the association, at the conclusion of the film story.

Mr. Moore briefly discussed the confusion that is now existing in the freight situation due to the recent increase in freight rates. The distribution of oil products is greatly disturbed by great changes in the relativity of rates. This has operated to give some companies undue advantages over others and to make it impossible for other companies to compete in territory which they regularly served. The amount of feeling displayed in the short discussion indicated that our present situation in freight rates is due for a drastic overhauling before it can be considered equitable in its operation.

Felix Renick, secretary of the New York Petroleum Exchange, made the next address on the subject of the "Relation of the New York Petroleum Exchange to the Industry." Mr. Renick rapidly reviewed the work of the exchange in providing a market for oil securities. The plans of the organization provide for the establishment of a market place for trading in oil securities, a rating bureau which shall receive reports from the companies, a statistical department that will collect information from companies and general sources, and a National Petroleum Club, limited to 1,000 life members, with a library and oil map collection as adjuncts. The plan of the organization is similar to that of the New York Stock Exchange, and its operation will be like it, with the difference that it will be confined to the oil industry. Mr. Renick was of the opinion that the exchange would broaden the market for oil securities, reduce the cost of providing capital for enterprises of a legitimate nature and reduce the fraudulent operations of unscrupulous promoters.

J. O. Lewis, chief of the petroleum division of the U. S. Bureau of Mines, presented the subject "Crude Petroleum and the Ever-Increasing Demand for Petroleum Products." He pointed out the inadequacy of the domestic petroleum production to meet the demand without assistance from foreign sources. The solution of the existing problem, he said, was to be found not in any one thing but in a number of things, such as the recovery of existing supplies in oil fields exhausted by present methods, the development of foreign fields, the discovery of new fields, greater economy and efficiency in the use of products, the development of shale oil deposits, the retorting of bituminous coals and the elimination of all preventable losses in storage and transport.

C. B. O'Hare, manager of the *Petroleum Magazine*, of Chicago, followed with a brief plea for co-operation between refiner and jobber. The afternoon session was closed by a summary of the work of the U. S. Bureau of Standards in investigating lubrication. The paper was written by W. H. Hershell and John E. Schulze and was read by H. C. Dickenson.

At the evening session George E. Collins, of Denver, presided. Mr. Collins called attention to the increasing importance of good engineering in the oil industry in introducing A. W. Ambrose, in charge of the Bartlesville experiment station of the U. S. Bureau of Mines. Mr. Ambrose spoke on the subject "Engineering Applied to Oil Field Production Problems."

Dr. V. C. Alderson, of the Colorado School of Mines, was then introduced and briefly presented his impressions of the Scotch shale oil industry.

The next paper of importance was by Martin J. Gavin, of the petroleum division of the U. S. Bureau of Mines, on the subject of "Possibilities of Oil Production from Shale." Mr. Gavin gave a thorough analysis of the conditions under which the shale oil industry is operating in Scotland. He presented an analysis of conditions applying to the exploitation of oil shales in the United States. He stated that all American shale oil so far produced was much poorer in quality than the Scotch shale oil but that there was some hope of remedying such deficiency, in part at least, by further research as to proper conditions for retorting and refining. He pointed out the need for extensive research but expressed the opinion that in the course of a few years results of commercial importance are to be expected. He emphasized the point so often expressed that large capital was necessary and technical direction essential to the successful working out of the complicated problems involved.

Third Day's Sessions Opened

The meeting on the morning of Sept. 30 was opened by M. J. Byrne, president of the Connecticut Oil Co., of Waterbury, Conn. A. H. Callaghan discussed ethical trade practices. John C. Howard followed with a short but interesting review of the history of oil development in Wyoming. In closing, he briefly referred to oil developments in Utah, stating that while the northern part of the state held forth nothing promising, the central and southern parts are the scene of much activity and some of the large operating companies are giving serious attention to the more favorable localities. F. A. Bean, of Ft. Wayne, Ind., discussed the operation and maintenance of filling stations and C. P. Bowie, of the U. S. Bureau of Mines, closed the morning session with a paper on "Oil Storage and Transportation."

In the afternoon E. E. Somers, of the Somers Oil Co., Denver, Col., presided. He introduced J. O. Lewis, who, in the absence of Dr. F. G. Cottrell, read his paper on "Relation of the Bureau of Mines to the Oil Industry."

The next speaker was Dr. Van. H. Manning, of the Petroleum Institute. Dr. Manning discussed the international aspect of the petroleum industry, and in concluding proposed the following:

"1. To make a careful study of the oil resources of the world and the laws and regulations governing these resources (as described).

"2. Congress should enact a general reciprocity measure covering all trade relations with foreign countries.

"3. To encourage our nationals to acquire and develop and market oil in foreign countries: (a) By an assured adequate protection of our citizens engaged in securing and developing foreign oil fields; (b) By promotion of syndication under a charter of the United States of our nationals engaged in foreign business, in order to effectually conduct oil development and distribution of petroleum and its products abroad."

Sheldon Clark, of the Sinclair Refining Co., Chicago, followed Dr. Manning and pointed out the need for American exploitation of foreign oil fields and the necessity for the Government to get back of the oil industry. P. F. Walker, dean of the school of engineering, University of Kansas, discussed methods for conserving oil and gas in the field. A paper by H. H. Hill, of the Bureau of Mines, on "Refinery Problems," closed the session.

In the evening a banquet was held at the Albany Hotel. President Gay presided. The speakers were Senator Charles S. Thomas, Governor Oliver H. Shoup and James C. Berger. A musical program and songs interspersed the program.

At the business meeting on Oct. 1 the following officers were elected: President, T. J. Gay, Little Rock, Ark.; sergeant-at-arms, Albert J. Squier, New York; new directors: W. H. Barber, Minneapolis, Minn.; G. I. Sweeney, Peoria, Ill.; M. W. Collins, Philadelphia, Pa., and J. T. Barry, Kansas City.

The following resolution was unanimously adopted: "Resolved, that the present percentage advance in freight rates is ruinous to the independent oil industry throughout most of the country; that application to the railroads and to the Interstate Commerce Commission should be immediately made to revoke the recent percentage advance in freight rates on petroleum products and to revise the same on a basis of a flat advance in cents per hundred pounds to maintain the market differential between the large pipe line oil companies and the independent oil companies; that questions arising on intra-state freight rates on crude petroleum delivered from fields to refineries in the same state present problems individual to each of the representative states and these questions should be handled on their respective merits by the individual state commissions, and this association urges the immediate attention of the state commissions to those problems."

On Friday afternoon the delegates and their friends were taken on an automobile trip of seventy miles through the mountain parks in the vicinity of Denver. Luncheon was served on one of the high peaks of the Rockies. The closing feature in Denver was a dinner given by the president of the association to the Colorado State Oil Convention Committee. On Saturday a party left on a special excursion to the shale deposits at DeBeque.

National Safety Council Holds Ninth Annual Congress Sept. 29 to Oct. 1

Record Attendance, Number and Variety of Papers and Discussions, and Increased Interest Mark Meeting of Safety Enthusiasts at Milwaukee—Mining Section Holds Sessions Which Cover Coal and Metal Mine Methods and Plans Extension of Activities

STAFF CORRESPONDENCE

THE Ninth Annual Safety Congress of The National Safety Council established a new record for large attendance, the registration having exceeded 2,500 on the last day of the conference. There was also a greater number of papers which were presented at the various sessions and it was very evident that added interest has been and is being shown in the safety movement which is being so well promoted by the Council. Following the custom established by the Council, the meeting was made the occasion of a "No Accident Week" in Milwaukee and it was later announced that only one accidental death had occurred as against seven in the corresponding week the year previous.

At the annual meeting held on Monday morning, Sept. 21, an address of welcome was delivered by Mayor Daniel W. Hoan. This was followed by reports of the president, the general manager, and six committees, and then the election of directors. In the afternoon a public mass meeting, of which George P. Hambrecht of the Wisconsin Industrial Commission was chairman, was held. Marcus A. Dow, general safety agent of the New York Central Lines, gave an address on "Safety Service," and Dr. Franklin C. Wells, medical director of the Equitable Life Assurance Society, spoke on the subject, "Human Conservation." Both of these speakers were well received. In the evening a reception and informal dance was held at the Auditorium Arena. Tuesday's meetings opened with a general "Round Table" discussion which was participated in by members of all sections. Following this, there were the sectional meetings which occupied the balance of the day and took up the greater part of the time during the remaining days. The following is a list of the sections which held meetings: Public Safety, Public Utilities, Employees' Publications, Foundations of Safety, Health Service, Mining, Automotive, Cement, Chemical, Construction, American Association of Industrial Physicians and Surgeons, Meat Packers, Metals, Paper and Pulp, Rubber, Steam Railroad, Textile, Woodworking, Safety Bulletins, Education, Engineering, Women in Industry, Electric Railway, Employees' Benefit, and Boy Scouts. No attempt will be made to cover the meetings other than those of the mining section, although many of them were of interest to mining men.

The first session of the Mining Section was held Tuesday afternoon, there being about sixty present from various sections of the country. C. A. Mitke's paper, "Vocational Training as Influencing Safety and Efficiency," was read by the chairman, B. F. Tillson. Mr. Mitke's paper stated that during labor shortages it was difficult to obtain the results from vocational training that were procurable under normal conditions. He recommended that the training should be carried on not only in the classroom but on the actual work underground, and pointed out the success that had been met with in the plans which had been followed to obtain a standardization of drifting and stoping methods. In the discussion of this paper, E. E. Bach of the Pennsylvania Americanization Bureau said that his company was at present conducting a campaign for "English First," and that this step should be promotive to the vocational training idea. J. W. Reed of the Consolidation Coal Co. told of the success his company has had in the establishment of schools, and said that in addition to the courses in reading, speaking and writing English their mining course had attracted considerable attention from the men.

The next paper, "Industrial Nurses in Mining Communities," was read by the author, George Martinson, safety inspector, Pickands, Mather & Co. The following is an abstract:

INDUSTRIAL NURSES IN METAL MINING COMMUNITIES

It has been established beyond any doubt that a contented workman is more efficient than one who is discontented. Inasmuch as the success of an industry depends upon the efficiency of its employees, it is therefore wise to consider their happiness and contentment. If it is within the power of an organization to remove any causes of inefficiency and unrest, it should be done. There are numerous causes of unrest and they present as many problems and remedies. Not the least of these problems is that of keeping the family contented.

The larger proportion of the miners in the Lake Superior districts are of foreign birth. They have settled in the mining communities with their families. Their wives, being of foreign birth, have come to this country, usually leaving their relatives across the water. They have no warm friends, they have missed the social life to which they were accustomed in the country from whence they came. Finding no social life, it seemed to them that an insurmountable barrier prevented the enjoyment of the social diversions they craved. If this condition existed for a considerable period, what would be more natural than to have them become disgusted with America and its industries which, to their minds, was responsible for their unhappiness. This unhappiness would eventually affect the work of the husband, for instead of finding his helpmate waiting for him with a smile, he would be greeted with a tale of dissatisfaction. With these conditions prevailing, it makes no difference how good the working conditions, or how large the pay check, the man will eventually leave the community for one in which he thinks his family will be satisfied. They will move and find conditions in their new home about the same. After a few more moves, always looking for that better place but never finding it, the workman becomes dissatisfied also, and he begins to feel that the industry is responsible for his unhappiness. When this idea begins to enter his mind, he becomes a comparatively easy prey for the sleek-tongued agitator.

It makes no material difference upon whom the responsibility for this condition rests. It concerns the operators as an industry, and they must prevent it. In other words, they must help supply the joy and happiness which will supplant the tears with laughter, the first requisite of the true life.

It is advisable to employ a person who will be able to fulfill the duties of a nurse and social worker as well. By virtue of her professional training, the nurse can be of service to the workers at the time when they are in trouble and most responsive to kindness. After having gained their respect and love in this way, she can begin her social duties.

A brief explanation of the plan followed by Pickands, Mather and Co. in the Lake Superior district might be of interest. The nurses are members of the safety department, and do their work under the direction of the safety inspector. They are also, of course, responsible to the general superintendent or manager of the group of mines in the district in which they work. Their responsibility to the physician concerns only the cases which he is caring for.

In the discussion which followed the presentation of Mr. Martinson's paper, Mr. Tillson desired to know if any

absenteeism on the part of the miners was investigated by the nurses. To this Mr. Martinson replied that such work was done by the local safety men. Mr. Reed also stated that the work of the nurses in his company was purely that of welfare. Much of the discussion following centered about the actual duties that visiting nurses should perform as most of those present were in agreement concerning the employment of such. The "Round Table Discussion" which was scheduled for this session, was postponed owing to the lateness of the hour.

"Smile Party" Substituted for Smoker

In the evening a "Smile Party" was held in the Arena of the Auditorium, and was attended by about two thousand. Several vaudeville acts were staged, a light lunch was served, and the gathering was concluded with an excellent burlesque on the various industrial sections. Several creditable numbers were rendered by the local Elks' chorus and that of the Federal Rubber Co. under the direction of Otto Singenberger.

First Aid Standardization Advisable

The first paper presented at the Wednesday morning session was "Standardization of First Aid Contests," by Major M. J. Shields of the American Red Cross. Major Shields stated that in view of the large labor turnover at mines it was difficult to maintain efficient first aid work unless a permanent plan of standardization in methods was followed. He advocated as standard the prone-pressure method of resuscitation, the use of iodine with a sterile dressing, the prohibition of the washing of wounds and the application of external heat for the treatment of shock. In the matter of judging first aid contests he recommended that all judges should be men who have had experience in the teaching of first aid work or who had previously judged such contests. In order to eliminate the employment of incompetent judges and an extended prolongation of the contest, Major Shields stated that the meets should not be participated in by more than 50 teams and that not more than 20 teams should take part in the final contest. A questionnaire which was sent out to 45 mining companies brought the following returns: 42 gave first aid training to their men; all agreed that first aid was of value; 14 favored, as a textbook, the Red Cross, Miners' Edition; 11 the Bureau of Mines, Advanced First Aid; 15 had no preference; 3 favored other textbooks, and 12 returned no answer. Thirteen companies declared that 5 per cent of their men were trained in first aid; ten trained 10 per cent; two trained 15 per cent; three, 25 per cent, and three other companies extended the training to as many as 50 per cent of their men.

In the discussion following, D. Harrington of the Bureau of Mines, Denver station, expressed himself as being in favor of standardization of first aid contests for he stated that erratic judging had been the means of placing contests in disfavor in some sections. George Martinson said that the reaction which followed contests was, in general, detrimental to the work, as many of the men showed a disinclination to practice. Orr Woodburn of Globe, Ariz., took exception to this and said that on the contrary the men were stimulated by the contests and that this was one method of reviving interest. B. F. Tillson declared in favor of contests and compared them to baseball in that the best team did not always win. Further discussion was participated in by J. W. Reed, Dr. W. H. Lynott, R. H. Seip, Dr. E. R. Hunter, and C. E. Julihn.

The next paper was that of L. F. Mitten, engineer of the Vulcan Iron Works at Wilkes Barre, Pa., "Safety Devices on Winding Engineers."

Examination of Hoisting Engineers Should Be Compulsory

In discussion, Horace F. Lunt of the Colorado Bureau of Mines said that in Utah a physical examination was required of all hoisting engineers, as it was found that many of the men so engaged were deaf. Martin Flyzic of the State Safety Board, Olympia, Wash., said that the safety of men being hoisted was of the greatest importance, and rigid requirements were made of all the hoisting engineers in his district. The men must be suited physically, mentally and temperamentally for the work. William Conibear of the Cleveland-Cliffs Iron Co., Ishpeming, Mich., stated that at the mines of this company the safety of men being hoisted was in the care of the cage-riders. Further discussion was given by Mr. Tillson, Sim C. Reynolds of the Aetna Life Insurance Co., and John T. Bradley.

Following the discussion a paper, "Signalling from Moving Cages," by Carl A. Allen of the Salt Lake station, Bureau of Mines, was read. This paper is an elaboration of an article which Mr. Allen has already published in the Bureau of Mines "Monthly Reports," an abstract of which appeared in the July 31 issue of *Engineering and Mining Journal*.

In discussion, Mr. Conibear stated that he opposed the idea of having the hoisting of a cage interfered with by anyone on the cage. In contrast to this opinion Mr. Harrington quoted the instance of the North Butte fire where the men were unable to signal when attempting a rescue as the landing to which they were lowered was burned out. Other discussion was offered by Mr. Woodburn, Mr. Seip, Mr. Lunt, Mr. Reed, W. W. Gidley of the Phelps-Dodge Corporation, and Mr. Reynolds.

Engineers Visit Local Plants

No session was held in the afternoon, but several members of the section availed themselves of the opportunity to visit the Cutler-Hammer plant. A number of special switches and controllers were shown to the visitors. Others visited the plant of the Milwaukee Coke and Gas Co. where a model of a new loading machine invented by S. H. Hunt, chief engineer of the company, was on exhibition. This machine claims to load 116 cars of 2½ tons capacity in eight hours.

Prevention of Gas Explosions Discussed

On Thursday, Sept. 30, the mining session was opened with the paper, "General Rules for Gas Explosion Prevention in Bituminous Coal Mines," by R. A. Walter, superintendent of the Mulga Works, Woodward Iron Co., Mulga, Ala., and this was followed by the reading of the paper, "General Rules for Gas Explosion Prevention in Anthracite Coal Mines," which was prepared by Joseph J. Walsh, District State Mine Inspector, Nanticoke, Pa. Both of these papers were discussed. particularly by those interested in coal-mining fields.

The paper, "Mine Rescue and Recovery Operations," was read by the author, Orr Woodburn, director of the Globe-Miami District Mine Rescue and First Aid Association, Globe, Ariz. Mr. Woodburn outlined the considerations necessary to handle mine fires and other disasters and emphasized the need of proper equipment and organization. He gave a brief summary of the plan which is followed by his association at Globe and detailed the equipment which is maintained by each of the mining companies participating in the association. The general rules to be observed in the event of a mine fire were also given.

Following Mr. Woodburn's paper, Robert H. Seip, Safety engineer of the New Jersey Zinc Co., Franklin, N. J., presented his paper, "Requirements of Rescue Training for Metal Mines."

The Annual Banquet

The annual banquet was held Thursday evening in the Arena on the first floor of the Auditorium and was well attended. The program was arranged with special thought of the historic significance of the occasion, for it was at Milwaukee that the National Safety Council came into being eight years previous. Phil A. Grau, business manager of the Milwaukee Association of Commerce acted as toastmaster. After introducing members of the organization committee and the first executive committee of the Council who had been invited to occupy seats of honor at the speaker's table, Mr. Grau called upon Major H. F. Doidge, who was in attendance as the personal representative of Lord Leverholme, the head of the British Industrial Safety First Association. Major Doidge told of the safety movement in Great Britain and stated that the knowledge of the accomplishments of the Council and their co-operation had been of great assistance in the work. He also read a letter of greeting and congratulation from Lord Leverholme to members of the Council. Arthur T. Morey, president of

the Commonwealth Steel Co., was the next speaker. Mr. Morey characterized the safety movement as the spirit of service and unselfishness and paid special tribute to those men who were instrumental in the formation of the National Safety Council. He then introduced R. W. Campbell, chairman of the Central Safety Committee of the Illinois Steel Co., who was the first president of the National Safety Council. Mr. Campbell outlined the history and the rapid growth of that organization and stated that much of the progress of civilization depends on the continuation of the safety movement. It is necessary, he said, that the idealism of safety be made practical. The toastmaster then introduced H. Walter Forster of the Independence Associates, Philadelphia. Mr. Forster was asked to speak on "Impressions," and in addition to adhering conscientiously to one interpretation of the subject he made a decided impression on those present. He spoke in a light vein and called the attention of his hearers to certain proclivities and peculiarities of his fellow members of the executive committee, all of which was taken in good part. A. T. Morey announced the officers for the ensuing year as follows; president, Charles P. Tolman; first vice-president, W. H. Cameron; second vice-president, W. E. Worth; third vice-president, L. A. De Blois; fourth vice-president, J. A. Oartel; general manager, C. W. Price; secretary and chief engineer, S. J. Williams; treasurer, W. H. Frater; assistant secretary, R. T. Solensten. Following this announcement, Mr. Tolman, the new president, spoke briefly on the aims of the organization. He stated that the American safety movement was a democratic one, and as evidence of this called attention to the fact that there are now in this country about 50,000 workmen on safety committees. Following the adjournment an informal dance was held.

At the fourth session of the mining section, which was held on Friday morning, the papers, "Accidents from Falls of Roof and Ground in Metal Mines," by John L. Boardman and W. S. Bates of the Anaconda Copper Mining Co., and "Accidents from Falls of Roof and Ground in Coal Mines" by H. A. Kudlik, chief safety inspector, Delaware-Hudson Coal Co., Scranton, Pa., were read by Chairman B. F. Tillson. An abstract of the former paper follows:

Accidents From Falls of Rock or Ore

The driving of drifts and crosscuts include mining operations which should, on the face of things, be the least hazardous with reference to falling ground. These operations are usually performed in virgin ground; the back or roof is always within a reasonable distance of the miner and easily reached for barring down. Timbering is simple and easy and all other conditions should tend to make this the safest mining operation. However, figures show that the very safety of this class of work actually tends to a larger accident rate.

Square set stoping, which from the nature of the work should be considered more hazardous and which is estimated at 70 per cent of the total mining work, has caused only 63 per cent of the falling ground accidents. Rill stopes where no timber is used, and where the working floor is on a slope corresponding very nearly to the angle of repose of broken ore, which is estimated at 9.5 per cent of mining work, caused only 10.3 per cent of falling ground accidents. Timbered rills and stull stopes, which on account of the timber used should be considered safer, are responsible for 3.3 per cent of the underground mining and caused only 1.29 per cent of the accidents. Back filling stopes, which are not timbered and where the working floor is on broken ore, are responsible for 1.07 per cent of the mining work and only 0.88 per cent of the falling ground accidents.

From this information it may be deduced that in the more dangerous mine workings the miner by increased vigilance renders himself less liable to injury than does the man working in the "safe place," who puts too much trust in the ground holding up.

In the discussion which followed, Mr. Conibear asked for expressions of opinion concerning the effect on accidents of timber scarcity. Mr. Gidley replied that the scarcity of timber had an appreciable effect upon accidents in the mines of his company and that it was necessary that at all times there be an adequate supply. Mr. Flyzik of the State Safety Board, Olympia, Wash., stated that although there was a good supply of timber in his section it was essential that the delivery of timber at the mines is such that the men can procure it for their working places with a minimum of effort. Mr. Conibear outlined in a general way the plan of safety inspection followed by his company and emphasized the need of contact between the shift bosses and the officials. Each shift boss is virtually a safety inspector and each receives a prescribed course of training in the school that is maintained by the company. Mr. Martinson stated that in the mines of his company the shift bosses were held responsible for the safety of the men in their charge. B. F. Tillson said that excellent results had been obtained in the mines of the New Jersey Zinc Co. by offering inducements to the foremen obtaining the lowest accident records.

During the past year the mining section has given consideration to the need for a paid technical secretary, and Mr. Tillson outlined at this meeting the steps that had been taken. It has been suggested that an employee of the Bureau of Mines be detailed for this work and that the additional expense be defrayed by such allotment as is necessary from the mining section of the National Safety Council. The matter has already been taken up with F. G. Cottrell, director of the Bureau, and he has agreed to give the matter full consideration. C. E. Julihn of the Minneapolis station of the Bureau of Mines said that it was quite essential to bring the work of the Bureau home to the industry. He expressed himself as being in favor of the plan proposed by the mining section and said that such an idea would necessarily accomplish that and also aid in the work that the National Safety Council was doing.

"Hazards Met in Open Cut Mining" was read by the author, D. E. A. Charlton. This paper appeared in the *Engineering and Mining Journal* of Oct. 2. "Hazards Met in Anthracite Stripping," by F. S. Gallus, district superintendent of strippings, Lehigh Coal and Navigation Co., Lansford, Pa., was read by Mr. Tillson. Following this, Mr. Martinson spoke of the method of flood lighting which is now being used in the open-pit mines of his company on night work. Fusees, similar to those used by the railroads, are also used to indicate points in the pits where blasting is being done at night so that the men are advised and can seek proper shelter. W. W. Adams, statistician of the Bureau of Mines, made a plea for prompt statistics on accidents. He told of the work of collecting statistics and added that the work of that part of the Bureau would be greatly facilitated if the reports were sent in promptly.

Medal Offered By Mining and Metallurgical Society

Announcement was made by Chairman Tillson of the gold medal which is to be awarded by the Mining and Metallurgical Society of America for distinguished service in increasing the safety of men in mining and metallurgical operations.

R. Dawson Hall, chairman of the nominating committee, read the report of his committee and named the following officers for the ensuing year: B. F. Tillson, chairman; Dr. A. F. Knoefel, first vice-president; George Martinson, second vice-president; and Guy J. Johnson, third vice-president. The report was accepted and a unanimous ballot cast for the slate as offered by the committee. Before adjournment a vote of thanks was tendered to Mr. Tillson and the other officers for their service during the year.

Of no small interest to the visitors and members of the Council was the Safety Exhibit which was held in Machinery Hall of the Auditorium and remained open during the entire week. Over 200 booths had been prepared and in these were shown most of the safety devices that are on the market today, either as models or full-size working exhibits. Many of these applied to industrial fields other than those of mining, but all were worthy of attention. Among the exhibits shown were mine rescue, breathing, and resuscitating apparatus, safety lamps, electrical safety switches, controlling devices, metal safeguards for machinery, safety goggles, first aid material, safety signs, anti-slip treads for stairways, portable projectors for showing safety work, and drinking fountains and other sanitary equipment.

ECHOES FROM THE FRATERNITY

SOCIETIES, ADDRESSES, AND REPORTS

Anniversary of Discovery of Gold Celebrated at Dawson

The twenty-fourth anniversary of the discovery of gold in the Klondyke, held at Dawson City under the auspices of the Yukon Order of Pioneers, was specially notable. On the same day the aviators engaged in a flight from New York to Nome, Alaska, arrived at Dawson and Right Reverend Bishop N. O. Stringer, known and respected among Yukon pioneers, delivered an interesting address.

Bishop Stringer's speech sketched the history of the north country and truthfully interpreted the spirit of its present residents. He said, in part,

"All honor to the pioneer. We feel a thrill of pride at the thought of the perseverance and endurance and optimism of the trail blazers of bygone days. The experience of the war proves that the present generation shows no deterioration. That men and women are capable of doing great things now as in past ages. It needs only the occasion and demand to bring out the greatest attributes of mankind. So also the qualities that go to make up the pioneer are not extinct. We have today men and women in this country who are as capable and resourceful as the pioneers.

"This is the second Discovery Day celebration since the conclusion of the war. . . . This time of peace is a day of opportunity. The future is before us. We possess a land full of resources and boundless possibilities. Who would have thought in the days when the Harpers, McQuestens, Ladues, Mayos and, later, the O'Briens and many others, wandered over this virgin land seeking for gold, that the time would come as it did when, within eight years (1898-1905) a hundred millions in gold would be taken from the tributaries of the Klondyke, mostly by primitive methods. When and where we shall have another Klondike no one can tell . . . we hope it will be Mayo, but, wherever it is, I believe it will be only the forerunner of other discoveries in days to came. . . . *We* take it as a matter of course, that this district can produce potatoes and other vegetables successfully, and that certain grains can be ripened, but many people outside are still astonished to hear this and some will scarcely credit it. . . We are only at the beginning of things agricultural.

"I look forward also to the time when the great barren lands of the North will teem with reindeer and other animals suited to the conditions of the country and climate. Whatever success this country may encounter in the future it will be largely due to the pioneers who led the way and who will still carry on in spite of all obstacles."

"How appropriate it is that at this celebration of pioneers we should now be about to welcome the pioneers of the air who alight in our midst for the first time. This feat is prophetic of the time when we shall no longer be isolated from what we call the outside world, when the difficulties of navigation in air will be overcome and when the words "outside" and "inside" shall have lost their meaning and when we shall be connected with the world generally by steel on land and by wings through the air. It is an epochal day for Yukon and for the North generally. All honor to the birdmen.

Gold Premium Bill Endorsed by Colorado Bankers Association

At the annual meeting of the Colorado Bankers Association in Denver, the alarming decrease in gold production was a subject of discussion. The merits of House Resolution No. 13201, known as the Gold Excise or Premium Bill (or McFadden Bill) was considered and the following resolution adopted:

WHEREAS, the constantly shrinking volume of gold available for monetary purposes is attracting the attention of bankers throughout the country and believing this matter to be one which is of serious import, and with a view to stimulating the production of new gold within the borders of the United States, we unqualifiedly endorse House Resolution No. 13201 of the Congress of the United States, known as the McFadden bill, and urge its passage. We consider it of the highest importance that the gold mining industry of this country be fostered and encouraged, to the end that a basis for credit and currency be not curtailed, and public confidence be maintained in our circulating medium;

Therefore, BE IT RESOLVED, that the Colorado Bankers Association, in convention assembled, endorse the McFadden Bill, and urge our representatives in Congress to do all in their power to obtain its passage, and that a copy of this resolution be sent to our representaives in the Senate and in the House.

Coal Deliveries Conforming to Spa Agreement

The French Ministry of Public Works has confirmed a recent statement by *L'Echo des Mines et de la Métallurgie*, to the effect that the coal deliveries by Germany to France are conforming to the Spa agreement. During August these deliveries exceeded 1,600,000 tons (metric). The agreement required 1,550,000 tons. It is stated by the same authority that this proportion held during the early part of September.

Canadian Institute of Mining Meets at Stewart, B. C.

The North Coast Division of the Canadian Institute of Mining & Metallurgy held a two-day meeting recently at Stewart, B. C., and was attended by representatives of all the important mining centers of the section.

E. J. Conway presided and among the speakers were vice-president E. E. Campbell and Peter E. Peterson, both of whom are connected with the Granby Consolidated Mining & Smelting Co. at Anyox. Mr. Campbell declared that the men most needed now were miners and metallurgists who could mine for a dollar when there was but $1.25 in the ore. He reviewed some of the work being done at Anyox and asserted that the operations there were being carried on at a lower cost per ton than at any other mine in the Dominion. The company concentration work, which Mr. Campbell characterized as unique, was dealt with by Mr. Peterson, who described the concentration methods and stated that these not only were adaptable to the treatment of the ores of the Stewart and Alice Arm zones but ultimately would be in use at those places. A. C. Garde of Prince Rupert, discussed the evolution of the mining industry of the Pacific Northwest.

Dr. J. A. Bancroft, professor of geology, McGill University, emphasized the value of the trained geologist in practical mining. He said that the big national mission of the geologist in the mining field was to work out the geology of districts before the coming of the prospector, thereby saving much useless work by indicating where mineral bodies were not to be found.

The session closed with a banquet at which Pat Daly, prospector and mining operator, referred to the closing down of the Big Missouri in the Salmon River district of Portland Canal. Mr. Daly was not inclined to accept as final the negative results of the limited amount of diamond drilling there and the decision to abandon work.

"Pilgrim half dollars," commemorating the tercentenary of the landing at Plymouth, Mass., in 1620, were issued by the Director of the Mint about Oct. 1. On one side the coin bears the head of a typical Pilgrim and on the reverse a view of the "Mayflower" under full sail. The price has been fixed at $1 each, and coins should be ordered through a bank from the distributing agent, the National Shawmut Bank, Boston, Mass. Any balance from the sales will be turned over to the Pilgrim Tercentenary Commission in official charge of permanent memorials at Plymouth, Mass.

MEN YOU SHOULD KNOW ABOUT

W. Young Westervelt, of New York City, has returned from a recent trip.

B. Britton Gottsberger, former general manager of the Miami Copper Co. was in New York City on Sept. 28.

F. A. Blakeslee, of the Institution of Mining & Metallurgy, London, is reported to have gone from England to California.

Cornelius F. Kelley, president of the Anaconda Copper Mining Co., who has been spending the summer at Swan Lake, has returned to New York.

Harry J. Wolf, consulting mining engineer, who has been in Butte, Anaconda, and Great Falls, Mont., recently, has gone to Sudbury, Ontario.

Alan M. Bateman, mining geologist, has been engaged in professional work in Alaska and British Columbia, and has now returned to New Haven, Conn.

Frederic R. Weekes has returned to New York from a two-month professional trip to the Portland Canal and Alice Arm districts, British Columbia.

H. W. Young, research engineer of the gas department of the Midwest Refining Co., Salt Creek, Wyo., attended the Independent Oil Men's convention at Denver.

Frederic Bradshaw, general manager of Tonopah Belmont Development Co., has gone to Colorado to inspect the Belmont-Wagner property of his company.

C. M. Weld, consulting mining engineer, of New York City, has moved his offices from 66 Broadway to new quarters at 2 Rector Street. (Phone: Rector 1421 and 1422.)

Millard K. Shaler, mining engineer, 66 Rue des Colonies, Brussels, left there on Oct. 1, to be absent about six months on an inspection trip to the Belgian Congo.

F. M. Van Tuyl, who has been examining oil lands during the past few months, has resumed his duties as head of the department of geology at the Colorado School of Mines, Golden, Col.

Homer Guck, for many years correspondent for the *Engineering and Mining Journal* at Houghton, Mich., is now associated with the Detroit Life Insurance Co., as assistant to the president.

Prof. Benjamin L. Miller, head of the department of geology, Lehigh University, Bethlehem, Pa., has returned from Panama, where he was engaged in the examination of some manganese deposits.

Hon. Clifford W. Robinson, of Moncton, N. B., formerly premier of New Brunswick, has been appointed Minister of Mines for that province in succession to Dr. E. A. Smith, who resigned recently.

N. L. Stewart, plant engineer, and **A. H. Richards**, both of the Garfield Smelting Co. of Utah, have returned to Garfield, Utah, from a visit to the Stepto plant of the Nevada Consolidated Copper Co.

John D. Galloway, resident engineer for north-eastern British Columbia, has completed an examination of mica property near Tête Jaune Cache, and the Taltapin property on Babine Lake. He has returned to Hazelton, B. C.

J. P. Hutchins, mining engineer, of New York City, has recently spent three months in Italy, including a trip to some of the ancient mines of the Trentino. Mr. Hutchins' present address is care of Hispano-American International Corporation, Juan de Mena, 10, 2do., Madrid, Spain.

Prof. Stanley M. Graham, formerly of Halifax, N. S., and a lecturer on the mining staff of Queens University, Kingston, Ont., two years ago, has been appointed head of the Department of Mining Engineering in that institution. He is the successor to the late Prof. J. C. Gwillim.

Dr. Charles E. Munro, chief explosives chemist, and **Spencer C. Howell**, chief explosives engineer of the Bureau of Mines, are in New York City on detail connected with the recent explosion in front of the U. S. Assay Office in Wall Street.

J. B. McArthur, a British mining engineer connected with the Associated Gold Mines of Western Australia, Ltd., is visiting mines in northern Ontario and will shortly leave for Australia and China, where his associates have extensive mining interests.

A. C. Watts, chief engineer of the Utah Fuel Co., has gone to the Sunnyside mine, at Sunnyside, Utah, to supervise the reopening of the property, and the reclaiming of that part of the mine which has been sealed off for the past month on account of fire.

G. J. Loughlin, the chief of the Division of Mineral Resources of the U. S. Geological Survey, is making an inspection trip to the Western offices of that bureau. He will also study the newly developed ore deposits in the Tintic and Morgan districts of Utah.

Henry N. Thomson, formerly head chemist for the Anaconda Copper Mining Co., and later superintendent of the Tooele smelter, International Smelting Co., has been appointed professor of metallurgy in the University of British Columbia, Vancouver, B. C.

Waldemar Lindgren, professor of geology in the Massachusetts Institute of Technology, has been in Wallace, Idaho, in connection with the pending apex litigation between the Federal Mining & Smelting Co. and the Hecla Mining Co. Professor Lindgren has been retained by the Federal company.

Donald G. Campbell, mining engineer, has returned to Seattle, Wash., after a year spent at Lost River, Seward Peninsula, Alaska, where he has been superintending the erection of several new concentrating mills. His address is care of Campbell, Wells & Elmendorf, Prefontaine Building, Seattle, Wash.

U. S. Bureau of Mines men at the Independent Oil Men's Association convened at Denver, Col., last week, included among others, F. G. Cottrell, director; J. O. Lewis, petroleum technologist; M. J. Gavin, A. W. Ambrose, Roy Collom, H. W. Bell, L. C. Karrick, C. P. Bowie, Frederick Tough, and H. H. Hill.

Collier Cobb, head of the department of geology at the University of North Carolina, is devoting a year's leave of absence to the study of the relations of certain shore line problems to harbor development along the Pacific coast. He spent a part of the summer in Alaska, and is now engaged in field work along the Washington coast.

OBITUARY

Burroughs Edsall, for some years in charge of the Rochester Merger Mines Co., died recently at Dansville, N. Y., after a lingering illness. Mr. Edsall was born in New York City and a graduate of Columbia College and also of Freiburg University, Germany.

Jacob Charles Denton, of Los Angeles, Cal., and formerly general manager for the Grand Pacific Co., of Superior, Ariz., disappeared mysteriously about June 1. His body was recently found buried in a cellar room of his Los Angeles house. He had been shot on an upper floor with a pistol found there. Just previous to the murder Mr. Denton had made telegraphic arrangements to meet friends in Phœnix, Kansas City, and Chicago on his way east on business. He was forty-six years of age.

SOCIETY MEETINGS ANNOUNCED

American Association of Engineers will hold a conference on employment and education at the Congress Hotel, Chicago, Ill., on Nov. 12. All free employment bureaus and agencies, as well as representatives from engineering societies and colleges, are invited to attend. The meeting purpose is to consider the general problems of employment, and a number of significant addresses have been promised. National headquarters is at 63 E. Adams St., Chicago, Ill.

American Mining Congress and affiliated bodies announces its twenty-third **Annual Convention** will be held at Albany Hotel, Denver, Col., Nov. 15 to Nov. 19, inclusive. It is planned to make this specifically a producers' meeting "for an open, frank, and unhampered discussion of the peculiar problems facing all industrial undertakings in the United States at this time."

THE MINING NEWS

The Mining News of ENGINEERING AND MINING JOURNAL is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

LEADING EVENTS

Tjosevig-Kennecott Suit Before U. S. Court of Appeals

Rowe and Tjosevig Fighting Extradition to New York

The U. S. Circuit Court of Appeals, which opened at Seattle recently, took as its first hearing, the case of George Francis Rowe and Christian Tjosevig, indicted by a grand jury in the southern district of New York for alleged use of the mails to defraud the public in regard to certain representations of mining stock in Alaska. The defendants are fighting extradition to New York to answer the indictment.

About fifteen years ago, according to a review of the case, Christian and Nels Tjosevig, brothers, located a group of claims in Alaska opposite the famous Bonanza and Jumbo copper mines of the Kennecott .Copper Co. In 1916 Rowe and others became interested and organized the Tjosevig-Kennecott Copper Co. The stock was offered on the New York Curb and was advertised as one of the finest copper properties in Alaska. A large share of the stock was sold.

In October, 1919, following complaints as to the affairs of the company, indictment by the grand jury of the Southern District of New York followed. After a local legal battle Federal Judge Neterer, of Seattle, ordered the removal of Rowe and Tjosevig to New York to answer the indictment. It is this order that is now being appealed.

Anaconda and Granby Shipping Copper East by Water

Both the Anaconda Copper Mining Co. and the Granby Consolidated Mining Smelting & Power Co. are shipping copper to the East by water. Anaconda has several hundred tons in transit which has been sent by rail to Seattle and thence by water through the Panama Canal to its eastern refinery. Granby has arranged with the Robert Dollar Steamship Co. to carry its copper from Vancouver, B. C., to Brooklyn, where it will be lightered to the Laurel Hill refinery of the Nichols Copper Co. Both companies will continue to ship in this manner under present conditions. It is said that the water route is cheaper and also quicker than the overland haul.

Mine rescue car No. 5, of the U. S. Bureau of Mines, will be at Tonopah, Nev., until Oct. 30, and at Goldfield, Nev., on Oct. 31.

WEEKLY RÉSUMÉ

Both Anaconda and Granby have started to ship their copper to the East via Panama instead of by the overland route, expecting thus to save both time and money. Anaconda has closed three mines, whose production is said to be unimportant. The property of the Nenzel Crown Point Mining Co., at Rochester, Nev., has been ordered sold at public auction. In the Coeur d'Alenes, the labor situation is said to be better. Steady improvement in mining conditions in Mexico is also reported from across the border. Purchase of the Croton Magnetite Mines Co. at Brewster, N. Y., has been effected by the Nipissing Mines Co., of Cobalt, Ont. From London comes word that Burma Corporation, Santa Gertrudis and Broken Hill Proprietary are issuing new capital.

It is reported from Washington that Director F. G. Cottrell of the U. S. Bureau of Mines is anxious to resign and various candidates for the position are talked of.

Northwest Mining Convention To Meet Next Winter

The Northwest Mining Convention will be held in Spokane, Wash., as usual next winter. Owing to the annual meeting of the A. I. M. E., in February, which draws many of the Northwest members, it has been decided that the convention will be held during the week of Jan. 31 to Feb. 5, 1921, closing ten days prior to the New York meeting.

The convention has become such an important event that there has been a complete reorganization of the controlling body. A committee of control has been made up of two members from each of the following bodies: Northwest Mining Association, mining committee of the Chamber of Commerce, Columbia Section of the A. I. M. E., Associated Engineers, Washington State Metal Mining Association and Spokane Stock Exchange. The committee's personnel is as follows: L. K. Armstrong, chairman; M. E. Poole, secretary; Sidney Norman, F. M. Smith, Frank A. Ross, Frank C. Bailey, R. S. Ord, A. D. Butler, Ivan De Lashmutt, E. H. Knight, C. E. Mallette, and Elmer G. Watson. Subcommittees from this list and additional members of the societies will be named, a convention hall and exhibit space will be selected and exhibitors will be asked to indicate their intentions.

Nipissing Acquires Iron Mines

The Nipissing Mines Co., of Cobalt, Ont., has purchased the control of the Croton Magnetite Mines Co., at Brewster, N. Y. The property is said to have large reserves of lean ore that can be readily concentrated.

Britain Gaining Supremacy as U. S. Ignores Gold Question, Says McFadden

Production Here Steadily Falling While That of Empire Increases Owing to Premium Paid

In an interview given out Oct. 7 Representative Louis T. McFadden, chairman of the Committee on Banking and Currency of the House of Representatives, has asked the following pertinent question with reference to the gold situation: "Is the United States to continue to ignore the problem of gold production, thus permitting the British Empire to gain an unquestioned supremacy?" The substance of the interview follows:

An estimate of the gold production of the United States based on the output for the first six months of this year indicates that the production for 1920 will be less than half the amount produced in 1915. In 1915 the United States produced 21.5 per cent of the total world's gold output, and the British Empire 3.7 per cent. In 1919 the United States produced but 16.6 per cent of the world's total gold output, while the British Empire produced in excess of two-thirds. Since July 24, 1919, the British Empire has been paying an exchange premium as high as 50 per cent to the gold producers of South Africa, where the bulk of the British gold is produced, while in the United States no assistance has been rendered the gold mining industry. This year the contribution of the United States to the gold production of the world will probably be not more than 12 per cent, about half of that which it contributed in 1915, while the stimulating effect of the exchange premium will probably increase the quota which the British Empire will contribute to 75 per cent.

REASON FOR DECLINE OF UNITED STATES PRODUCTION

As compared to 1914, the purchasing power of the dollar in terms of all commodities in 1919 was 47c. The gold producers' ounce in 1914 had a purchasing power of $20.67, whereas during 1919 the same ounce could purchase in terms of all commodities but $9.70. Since the price of gold is fixed by statute at $20.67 an oz., the gold producer is in the same position as a person who received the same income in 1919 as in 1914 and finds that a $2,000 income has shrunken in purchasing power to $970. "This is the principal reason for the decline of the gold production of the

United States from $101,000,000 in 1915 to less than $50,000,000 this year," said Mr. McFadden.

"The United States Mint sold for industrial consumption during 1919 nearly $22,000,000 more gold than was produced from the mines of the United States, while this year the drain on the monetary gold stock will probably be $40,000,000. The American Bankers Association passed a resolution on Oct. 2, 1919, urging upon the Government the necessity for maintaining a domestic production of new gold in sufficient volume to satisfy the industrial requirements of the arts and trades. To comply with the specifications of this resolution, the soundness of which cannot be questioned, I introduced H. R. 13,201 on March 22, 1920."

CONSUMERS NOW SUBSIDIZED

Since the industrial consumers of gold are the only ones in the country receiving raw material at the pre-war price, while the general increase in all commodities was 112 per cent in 1919 as compared with 1914, it is evident that they are being heavily subsidized. Mr. McFadden emphasizes that the imposition of this excise tax merely adjusts the cost and price equation between the producer of new gold and the consumer of gold in the industrial arts, and is free from all monetary entanglements. A free gold market is maintained under the provisions of this bill for the reason that the excise tax is collected on the finished product as sold, and not upon the bullion which is sold to the manufacturers. There is nothing in the bill which in any way alters the number of grains in the standard dollar, the unit of our monetary system. The bill creates the governmental machinery by which the consumer of gold in the industrial arts may pay more nearly the cost of production for his raw material. The stimulus to the gold producer specified in this bill is equal to the excise tax imposed, and is no greater than the exchange premium paid by Great Britain in the latter part of 1919 to the South African producer, whose operating conditions are more favorable than those in the United States.

HEAVY FRENCH TAX LEVIED

In addition to paying the exchange discount, which in the case of the French industrial consumer of gold would amount to 100 per cent more in francs than the price paid before the war, the French government has imposed a sumptuary tax for the use of gold in the fabrication of articles (other than money) of 60 francs per hectogram ($3.73 per fine ounce) by law of June 25, 1920. Previous to that date the guarantee tax was 37 francs, 50 centimes per hectogram. The French Government justifies this tax in a formal document transmitted by the U. S. Bureau of Foreign and Domestic Commerce, as follows: "Moreover this tax, striking as it does luxury goods, or unessential articles, enters into the category of a sumptuary tax, the levying of which is admitted a legitimate procedure."

It is important that the gold mining industry be kept alive for fear that with greatly reduced production there will be difficulty in retaining the gold standard during a popular campaign for credit restriction accompained by declining prices. The continued depletion of the gold stock by excessive exportation and industrial use will seriously impair the public confidence in the Nation's finance and currency unless a normal gold output is insured.

The gold mining industry will be completely shut down unless constructive aid is provided without delay, in which event it will take years to develop a normal output of gold at a very much greater expense. To allow the gold mines of the United States to cave in and fill with water entails a waste of developed gold resources, which in a most critical hour of financial need will cause want. No argument can be made in favor of waste. The time to act is now before the industry is shut down.

Leadville Mines Co. in Nevada Installing Small Mill

The Leadville Mines Co., 39½ miles north of Gerlach in Washoe County, Nev., is installing a 50-ton concentration plant. An existing plant which consisted of tables has been torn out and new machinery installed. The unit consists of a Marcy No. 54 ball mill operating in closed circuit with a Dorr Simplex classifier, the 48-mesh overflow of which flows to a Colburn vacuum flotation machine. The concentrates from this are partially dewatered in an 8-ft. Callow cone, the thickened concentrate discharge being drawn off by a Dorrco pump and further dewatered by a 3 x 2-ft. Oliver filter. The concentrate cake is directly sacked without drying. The tailings from the flotation machine are dewatered in a 24 x 8-ft. Dorr thickener and discharged to waste. The overflow, together with all overflow from vacuum and cone, is collected in a sump and used again.

The ore is a silver-lead zinc ore which by water concentration gave a ratio of 7 or 8 to 1. With the flow sheet as described the ratio will be from 10 to 12 to 1 with a recovery of 93 per cent of the lead and silver and with the zinc content of the concentrates below the penalty limit. By adjustment of the flotation machine the grade of the concentrates can be closely controlled. This is a matter of considerable importance, as the concentrates have to be hauled 39.5 miles to rail.

The power unit consists of an 80-hp., 4-cylinder engine using distillate and two semi-diesel engines of 100 and 75 hp. respectively. Owing to the altitude the power delivered by the engines is less than the rated power and is 64, 80 and 62 hp. respectively for the three engines. The power plant supplies both the mine and the mill. The mill and plant are being installed by Lindsay Duncan and Curtis Lindley, Jr., mining and metallurgical engineers of San Francisco, Cal.

Mexican Mining Situation Improving Steadily

Six Hundred Companies Added to List of Operators in Last Ninety Days—Extension of Railways Planned

The general mining situation throughout Mexico has greatly improved during the last three months and finds itself at the beginning of October in a much more satisfactory condition. The fact that silver, Mexico's leading mineral product, has maintained itself between 90c. and $1 per ounce establishes a much more stable basis for mining men to figure on and it is eminently more satisfactory than the boom prices which prevailed at the beginning of the year. Especially are conditions more satisfactory to the smelters, which are also heavy mine owners and operators, and upon whose general movement a great deal of the prosperity of the mines depends.

Labor conditions have also improved notably as a whole, in that they have become more normal. This is due in part to the rapid growth of the demand for mine labor, which is exceeding the supply. The natural consequence is an automatic advance in wages. With better wages and reasonable assurance of steady employment the Mexican miner lends small ear to the harpings of labor agitators and professional trouble organizers. Mining camps in this country now furnish barren soil for anything like Bolsheviki propaganda, although considerable headway is being made by the Russian "wing" as well as the I. W. W. in some of the larger centers and in the oil fields, where a great many foreigners are employed.

The recent order of the Secretary of the Treasury removing all Federal taxation on low-grade propositions in order to enable them to temporarily overcome many natural obstacles encountered in a period of reconstruction has heartened the small operators and literally hundreds of small properties, which have been idle for years, are being opened and development is being pushed. The treasury department has appointed a commission to keep "tab" on the general economic situation, with particular reference to mining activities, that is, fuel, transportation, imports, etc., and it is the evident intention to grade the mining taxes according to conditions from time to time.

In a statement just issued by the Secretary of Commerce and Industry of Mexico it appears that there are now in round numbers 30,000 mining properties with proper titles, out of which 4,000 and some odd are actually being exploited. This is an increase in working mines of over 600 in the last ninety days. Most of the renewed activity is in the northern states, though considerable life is shown in the central part of the country, particularly in Guanajuato, Zacatecas and Jalisco.

The same department of Commerce and Industry is giving especial attention to the extension of railway lines in territory which will produce heavy mining outputs. Contracts have been

let, for example, for extension of the branch from Parral, into the Inde and El Oro district, from Rosario, the present terminus; also for an extension of the Mexican Northern, which leaves the Central at Conejos, to the barranca fronting the Inde region; also an extension of the National Line in Durango into the Guanaceví district; also extensions in Zacatecas; from Durango to Mazatlan (now working); from Toluca through the state of Mexico and the state of Michoacan to the Pacific Ocean. In addition to railway extension projects several score contracts have been signed for extending automobile roads where railway lines are impractical or too costly. It will probably be possible by the first of the year to make a run from the City of Mexico to Acapulco, in auto, and return the next morning.

With the exception of cyanide, which has advanced slightly, there has been no appreciable change in prices of mining supplies during the last thirty days. There has been a slight drop in local market prices, that is, in beans, corn, meat, rice and sugar.

Coeur d'Alene Labor Situation Reported Improved

Men Returning from Surface Jobs as Winter Approaches—Open Shop Maintained

A steady improvement in the labor situation in the Cœur d'Alene district of Idaho is noted, and the prediction is made that the next few weeks will find the mines generally working with normal forces and with a corresponding increase in output. The chief difficulty has been that during and since the war the rate of wages for outside work has been as high or higher than that paid in the mines, and in that situation men naturally prefer surface work while weather conditions are favorable, and return to the mines only when driven to it by cold or otherwise disagreeable weather. Before the war wages in the mines were generally higher than for similar classes of work outside, and the increased pay acted as an offset to the objections to underground work. Another good feature of the situation in the Cœur d'Alenes is that the district is comparatively free from radical agitators. The firm attitude of the operators in maintaining the "open shop" system, together with the activity of the peace officers in the enforcement of the Idaho law against criminal syndicalism, have combined to bring about a very satisfactory condition throughout the district.

Kuskokwim River District Makes Record Gold Shipment

Marking a new epoch in northern mining development and representing the largest shipment ever sent out of the Kuskokwim River district between Seward Peninsula and the Aleutian Islands, a consignment of $150,000 in gold dust arrived in Seattle recently. This shipment represents the pioneering of placer miners panning the streams tributary to the Kuskokwim River.

Talk of Starting B. C. Steel Industry More Definite

President of Canadian Collieries Goes East in Interest of Project

BY ROBERT DUNN

In the last few weeks there has been much talk and the indications are that there will be some action with regard to the establishment of an iron and steel industry in British Columbia. For some time H. A. Fleming, president of the Canadian Collieries (Dunsmuir), Ltd., has been in the province investigating local conditions with respect to the iron ore resources of the country and the market that may be relied upon for such a Pacific Coast enterprise. Recently he interviewed William Sloan, minister of mines, in regard to the assistance that might be expected from the government in the event of his company entering upon the enterprise. The minister and Mr. Fleming went into the matter thoroughly and subsequently the latter issued a public statement the purport of which was that he felt convinced that conditions were opportune for making a start along the lines indicated. He said that he was leaving for the East, and would take immediate steps to get the matter forward. It was his hope that within a short time it would be possible to make a definite announcement.

The foregoing incident occurred after it had been announced from Vancouver that Nichol Thompson, a prominent resident of that city, who for some time has been interested in the promotion of an iron and steel industry for his province, had appeared before the Tariff Commission, now touring the Dominion and had there given evidence that there exists on the Pacific Coast a market up to 1,500 tons a day for iron and steel manufactured in British Columbia. It was stated by Mr. Thompson that he had reliable information on which to base this assertion, having just completed a tour of the Coast, made for the special purpose of inquiring into these particular market conditions. Mr. Thompson urged that in the interest of mining in this province the tariff existing on drill steel before the war should be continued. This permitted free importation of steel costing more than 3½c. per lb.

Talking about his experiences while on tour, Mr. Thompson affirmed that there existed a daily demand of from 1,000 to 1,500 tons of pig iron. In answer to inquiries Mr. Thompson explained that 20,000 tons of Texada Island ore had been treated at Irondale, in Washington, and that it had been used in conjunction with other ores in the manufacture of steel for two United States warships. The latter method had proved that the ores of British Columbia could be used to produce iron and steel without importing fluxing ores. The difficulty which had retarded production in the past had been the market.

Merrimac Co., Near Boston, Gets Returns on Silver-Lead Ore Shipment

The Merrimac Development Co., which is operating at Newbury, Mass., 32 miles from Boston, received returns averaging $67 per ton in gold, silver and lead on a car of silver-lead ore on Oct. 2 from the American Smelting & Refining Co. Further shipments are in progress. A new shoot of copper ore cut Oct. 1 on the 220-ft. level east has demonstrated the existence of a new deposit. Todd C. Woodworth is president of the Merrimac company.

Proposed Steel Deal Ratified

Shareholders of all companies concerned have ratified the proposal to sell out to the British Empire Steel Corporation, according to a press dispatch, and consummation of the contracts will be made immediately upon the $25,000,000 preference stock of British Empire Steel Corporation being sold, and the funds becoming available for the use of the new corporation. There has been considerable opposition from the finance department at Ottawa and from other interests in Canada against raising this money in Canada, and it is understood practically the entire $25,000,000 is being underwritten in London, subject to the clearing up of certain legal matters.

Tripoli Mining Near Seneca, Mo., Attracting Attention

Increased interest in the tripoli mining industry is promised for this district. About a year ago the Barnsdall Corporation of New York bought the Seneca Tripoli Co.'s plant and mines near Seneca, Mo., about 15 miles south of Joplin. For several months past, under the name of the American Tripoli Co., it has been combining the two tripoli mills that heretofore had been used in making the filters and tripoli powder, and now has this work virtually completed. The new and enlarged mill is located at Seneca.

This week announcement was made of the organization of the National Tripoli Co., and the purchase by it of a 253 acre tract of land south of Baxter on which an extended run of tripoli has been located, about five feet beneath the surface. Dr. T. A. Smith, formerly of Topeka, Kan., now of Joplin, is at the head of this organization, which plans the immediate construction of a tripoli mill on its lands.

Recent Production Reports

Phelps Dodge produced 7,998,000 lb. copper in September compared with 8,365,000 in August.

Inspiration produced 6,500,000 lb. copper in September compared with 7,200,000 in August.

The shipments of the Consolidated Interstate-Callahan in September were as follows: 4,230,000 lb. zinc concentrates, 2,180,000 lb. lead concentrates, and 21,800 oz. silver; which compare with 4,452,000 lb. zinc, 2,014,000 lb. lead and 20,140 oz. silver in August.

Iron Industry of Germany Reviving

Increase in Orders Slight But Gives Hope That Market Conditions Are Changing for Better

By Our Vienna Correspondent

Vienna, Sept. 10—After months of inactivity in the German iron industry there has recently developed a very slight increase in orders. Slight as it is, the circumstance arouses the expectation that the unsatisfactory market conditions have been overcome, and that by fall more active business will develop and serve to bring the factories safely through the winter. The revival is based on increasing orders of domestic consumers as well as on a very recent increased demand from abroad. There has been considerable decrease recently in stocks held by direct consumers and by dealers who had very considerable supplies a few weeks ago. As the traffic through second and third intermediaries has suffered a considerable decline it is natural that consumers should lose some of their diffidence. At present, however, most of the business has been in the form of inquiries to try out the market conditions, but in view of recent occurrences it may be safely assumed that 15 to 20 per cent of the queries will lead to actual orders. The reaction on the individual products of the market varies: Pig iron needs will be but partly met, chiefly because of the recent greatly diminished deliveries possible from the victor countries; rod, strap, and heavy sheet iron enjoy a continued strong demand; but the trade in light sheet iron continues very depressed. Contracts that had previously been closed at 9,000 or 10,000 marks per ton (metric) are now being made at as low as 4,000 marks. This will hinder the starting of new enterprises. The same holds for the piping market, since the cessation of building operations has stopped the demand for gas-piping. Further lowering of prices is the less to be expected since Exchange has further fallen and the contract prices for pig iron have risen considerably. Deliveries are usually demanded within two or three weeks, which the works rarely can meet.

Numerous orders for export are being received from the northern countries by way of Hamburg, in individual cases amounting to as much as 10,000 tons, and are in very many cases meant for deliveries to Russia. At present Switzerland and Holland are not so strong on the German iron market. In the case of the Netherlands this is due in part to the cheap freights in the German ports. Contracts for the building of 100 railway locomotives of the heaviest type will be closed with Russia, a deal involving 175,000 tons of steel and similar materials. The agreements concerning the delivery of rolling stock to France and Belgium are also on the point of being concluded. The mean degree of activity of the German industry as a whole cannot be estimated.

However, one may safely state that up to about 50 per cent of the normal peace time production and deliveries can be attained. Of late the labor problem has, happily, begun to show considerable improvement. The worst of these difficulties has been passed.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

Cottrell Anxious To Resign as Bureau of Mines' Head

Several Mentioned as Possible Successors—Position Should Go to Mine Operator, It Is Held

A change in the directorship of the Bureau of Mines is expected to take place in the near future. At the time the present director, Dr. F. G. Cottrell, accepted the place, he made it very clear that it was to be for a short time only. Dr. Cottrell is understood to be very anxious to take up the duties of chairman of the Chemical Division of the National Research Council, to which he recently was appointed to succeed Wilder D. Bancroft, who has returned to his work at Cornell University.

The suggestion that Pope Yeatman be tendered the place has met with favor among officials in Washington, but it is understood that Mr. Yeatman cannot be induced to accept the office. An effort was made to induce Herbert Hoover to accept the position. Mr. Hoover admits that the place tempts him but he is not in a position to accept it at present.

J. Foster Bain, formerly assistant director of the Bureau, has been sounded out but he has cabled from China that he cannot consider the proposition. His answer is not to be regarded as final, however, and additional efforts are being made to induce him to accept the place.

It is clearly recognized that the mining industry is very desirous that the place go to a man who has been prominently identified with the mining side of the industry. The demand seems to be for a seasoned man with a record of success as a mine operator—one who has shown resourcefulness and vigor and who is familiar with underground mining as distinguished from surface and financial operations. At the same time it is realized that any director of the Bureau of Mines must have an appreciation and leaning toward the scientific matters which are involved in mining. In addition he must be a man who can handle his labor problems in a sympathetic manner. Since the salary of the director is only $6,000, it is recognized that practically any man of that type who takes the position will have to make a decided sacrifice.

A man who will measure up to the foregoing specifications is said to be F. W. Denton, the vice-president of the Copper Range Consolidated Co. Mr. Denton's name has been submitted for consideration but since it was stated by those submitting his name that Mr. Denton had no knowledge of the matter, there is no certainty as to whether he would accept the place if offered it.

There is an increasing tendency on the part of Cabinet officers to look with favor on filling vacancies by promotion within the Bureau. It is known that consideration is being given to such promotions in connection with the selection of a new director for the Bureau of Mines. George S. Rice has seen many years' service as the Bureau's chief mining engineer. E. A. Holbrook is assistant director, the position from which Van. H. Manning was promoted to the directorship. Dorsey A. Lyon, the supervisor of stations, while a metallurgist, has had long experience in intimate contact with other phases of the mining industry. O. P. Hood, the Bureau's chief mechanical engineer, has had a long and successful period of service with the Bureau. His experience has been chiefly with the mechanical problems of mining, which is nine-tenths mechanical engineering, it has been said. Speaking generally, there is a desire on the part of division chiefs to round out their service as chief of the bureau, but in the case of the Bureau of Mines succession, none is entertaining the hope that he may be chosen since they are very familiar with the general feeling in the industry that the directorship should go to such a mining man as has been described above.

Silver Purchases Under Pittman Act Proceeding Smoothly

The Director of the Bureau of the Mint is particularly gratified with the satisfactory way in which silver purchases are being made under the Pittman Act. No efforts have been discovered of any attempt to represent foreign silver as being of domestic origin. Now that the procedure of marketing silver under the Pittman law is generally understood, the whole transaction is proceeding smoothly.

Reserve Board Reports on Mining in September

In its report on business conditions during September, the Federal Reserve Board has the following to say in regard to metal mining:

"Metal mining during the period in question still shows some stagnation. The output of gold in California and Nevada continues to fall off on account of the low purchasing power of the metal. Silver mines in Utah and Idaho are working on a basis which will probably be slightly ahead of 1919. Higher prices of silver early in the year probably stimulated production somewhat as compared with present conditions. Copper from the Arizona region will probably be produced in larger vo ume than in 1919. Elsewhere there is no substantial change. The lead output in Utah and Idaho has been small but some mines which were idle are now resuming operations, so that the yield for 1920 may exceed that for 1919. District No. 10 (Kansas City) reports that in the Colorado district there has been very little change during the month of August, but the recent advance in freight rates has produced some discouragement, while increased costs of supplies may further lower production. Zinc and lead, however, have shown considerable improvement in August, both in the volume shipped and the price paid, in the Missouri, Oklahoma and Kansas fields. Shipments of zinc ores increased 20 per cent over the preceding month and lead 12 per cent, the average price of zinc ore advancing $1 and lead $14 per ton. Stocks, however, have increased about 2,000 tons during the month in spite of increased shipments. A car shortage continues to be a serious problem in the shipments of ore, while the new freight rates will result in an increased cost of $4 per ton for slab zinc."

Gold Bonus a Financial Matter Bureau of Mines Holds

The Bureau of Mines is asked from time to time to support plans holding out inducements for greater gold production. In this connection it is pointed out at the Bureau that such matters as a bonus on gold is a financial rather than a Bureau of Mines matter. Half of the country's present gold production is not affected by present conditions, since the recovery of the gold is incidental to the mining of other minerals. The other half of the production may be regarded as teetering in the balance, but since that involves only $35,000,000 it necessarily must be secondary, the Bureau feels, to the effect which will be exerted on the whole business structure which might follow changes in the unit of value. It may be said, however, that the Bureau of Mines is very anxious to assist in eliminating waste and securing greater efficiency in gold mining operations.

War Minerals Awards

Awards in war minerals relief cases were recommended during the week ended Sept. 25 as follows (the name of the claimant, the mineral, the amount recommended and its percentage relationship to the amount claimed are shown): Florence Doty, manganese, $5,316.06, 56 per cent; J. B. Tilford, tungsten, $3,477.50, 68 per cent; Edmonds & McCurry, manganese, $1,774.96, 68 per cent; M. H. Cutter, manganese, $23,911.42, 66 per cent; East Tennessee Mining Co., manganese, $4,620.09, 79 per cent; Newport Mining Co., manganese, $10,551.20, 60 per cent.

Reconsideration was given to the chrome claim of M. A. Dellano, which had been disallowed. An award of $2,956.10, or 74 per cent of the amount claimed, was recommended.

NEWS BY MINING DISTRICTS

Special London Letter

Broken Hill Prop., Santa Gertrudis and Burma Corp. Issue New Capital

BY W. A. DOMAN

London, Sept. 21—Three mining companies are making issues of capital for the purposes of their undertakings, namely, the Broken Hill Proprietary Co., the Santa Gertrudis, and the Burma Corporation. On the question of financial methods, however, a fourth company comes on the screen this week. This is the Northern Exploration Co., formed comparatively recently to deal with coal, iron and marble deposits in Spitzbergen. The promoter was Mr. Salisbury-Jones, and he with a certain banking institution held absolute control of the company. Although substantial cash offers were put forward, no independent finance house could secure a footing. This seemed to prove the confidence of Mr. Salisbury-Jones and his associates in the future. The price of the shares went to the neighborhood of £4, a figure that evidently was too tempting to be resisted, for it is now stated that the control has changed hands. But Mr. Salisbury-Jones hopes to recover it. There are rumors that the Norwegian Government wishes to buy out the English coal companies operating in Spitzenbergen, with the result that Northern Exploration shares which have languished in the neighborhood of 10s. are nearly 20s. again. Certain persons, among whom is said to be Mr. Salisbury-Jones, have circularized the shareholders offering them 1s. —not 1s. a share mind—for the option to call their shares until the end of the year at £2. There is no need to point out who will make money on this arrangement, even if new capital be guaranteed.

Although still very important the mining branch of the Broken Hill Proprietary Co. plays second fiddle to the Newcastle Iron & Steel Works. Upon this undertaking the directors have expended over £3,750,000, and now in order to extend it, are about to issue £1,500,000 of debentures, and 420,000 shares out of 900,000 in reserve at the rate of one for five now held. There are already £748,100 debentures in issue. Until last year the operating results of the mine and of the steel works were shown separately in the accounts; they are now merged, which prevents shareholders from ascertaining whether the steel works are yielding a profit. That there is a fine future open to the works is undoubted, for two or three important English companies are establishing factories in the neighborhood to take advantage of the steel products.

Methods of finance change in mining as in other branches of industry. Years ago a mining company would never have attempted to raise capital on "notes," and it is only relatively recently that this method of providing funds has come into vogue. In one way and another the Santa Gertrudis has big business on hand, for it is about to ask for £300,000 in notes carrying 8 per cent interest, to be issued at 98 and to be redeemable at 115. There is, of course, much that is speculative in the offer, but it is pretty certain to go, for the company is sound and the premium is an attraction.

The Burma Corporation has just raised £1,000,000 in 8 per cent convertible first mortgage debenture stock at par. It is redeemable between 1925 and 1930 at 110. This, again, is distinctly attractive, for the ore reserves, proved and probable, at the property controlled, have a metal value at conservative prices of £100,000,000. The company is removing its domicile to the East in order to escape the high taxation of this country.

Business in mining shares is very quiet, being upset by Paris sales in order to provide funds for the new French loan.

MEXICO

Sonora

San Julian Co. Stoping at Tres Piedras—Remodeling of Mina Mexico Mill Almost Complete

Sahuaripa—Operation of the San Julian mill in the Sahuaripa district continues at one shift. A 90-per cent molybdenite concentrate is being made. Some first-class hand-picked ore is

also being produced. Ore and concentrates are brought from the mine to Nacozari, a distance of 210 miles, by mule-pack trains. The San Julian Mining Co. has recently acquired the Tres Piedras property, which is located about four miles north of the company's main holdings. Stoping operations have been commenced there and the ore is packed over to the mill.

Mina Mexico—At the Mina Mexico the mill is being remodeled. This work is about completed and its operation will shortly be resumed. It is reported that this company has a considerable tonnage of milling ore blocked out. There is also a considerable amount in mine dumps and in the old tailing dumps.

San Xavier—It is reported that the United States Smelting Co. has taken an option on the Los Animos mine at San Xaxier. They are examining the property and doing some development work at this mine and also at the Santa Rosa mine, an adjoining property. Operations by Loughlin and Schroder, owners of the latter property, are continuing as usual.

Suaqui—Work continues at the Progresso property near Suaqui. The mill is being run mainly on ore from the dumps and ore purchased from several small native operators.

Mr. Royer has an option from A. McFarlane on the Promontorio property near Suaqui. Development of the property is being undertaken, it is reported, in the interest of Guggenheim Brothers. The outcrop on which work is being done is a brecciated silicious mass approximately 500 ft. long by 200 ft. wide, the whole of which runs from 10 to 14 oz. of silver per ton.

Alamos—Two churn drill are being taken from Navajoa to Alamos. It is reported that they are to be used in drilling the La Verde property near Alamos.

Wilson and Obermiller are working the La Junta mine in the Minitas district, about 30 miles from Alamos. They are running a five-stamp mill.

Zacatecas

El Oro Investment Co. Contracts for Victoria Group—Option on La Noria Extended

The El Oro Investment Co., an English Corporation with large holdings in Mexico, has signed a contract with G. C. Palmer for the Victoria group of mines in Zacatecas. The property produces a medium grade silicious ore suitable for cyanide process.

The Fergus Allan Corporation has been granted an extension till Nov. 15 of their option to purchase La Noria property in the Sombrerete district. La Noria is one of the well known *antiguas* of this section. It has a vein extending over four kilometers with an average width of about thirty feet carrying silicious lime ore averaging 20 oz. of silver and some gold. The lessees finished unwatering the property on Sept. 15 and are now making active exploration.

CANADA

British Columbia

Lightning Peak Section Being Opened by Trail

Stewart—It is reported from the Alaska side of the Salmon River section, Portland Canal, that considerable interest now is being taken in the development of mining properties in this locality. It is likely that at least three properties will be working all winter. The New Alaska is to be opened up and a diamond drill is being used in exploration work on the property of the Fitzgerald Brothers. This property is located on Fish Creek. On another group of mineral claims, controlled by the Fish Creek Mining Co., a promising vein of ore has been encountered, and it is hoped that it will be possible to ship ore this winter.

Greenwood — The Lightning Peak mining section is being opened up by the construction of a trail, under the terms of the Mineral Survey and Development Act. The Provincial Government has been busy on this during the last season, and the work now is reported to be practically completed. Lightning Peak has an elevation of about 7,500 ft. In this locality are situated a number of mining properties which give promise of developing into importance. Among these is the Waterloo mine in which Greenwood people are interested. With the completion of the trail it will be possible to make the trip with pack horses from Greenwood to the peak in four days.

Victoria—A small force has been employed since last March on the Gabbro Copper Mines, Ltd., situated at Jordan River, Vancouver Island. Several large open cuts have been made. These have established a width of from 5 to 25 ft. of mineralized material having a length of 300 to 400 ft. There is a fair sized orebody averaging 3 per cent copper.

Trail — Shipments received at the Consolidated smelter during the week ended Sept. 21 totaled 8,810 tons. Shippers are given in the following table:

Mine and Location	Gross tons
Bluebell, Riondel	174
Josie, Rossland	223
Mandy, Le Pas	65
Monarch, Field	45
North Star, Kimberley	224
Ruth, Cedar Creek	108
Silver Bear, Zwicky	28
Skyline, Cedar Creek	37
Velvet, Velvet	31
Yankee Girl, Ymir	29
Company Mines	7,846

Ontario

Kerr Lake Finds More New Veins—La Rose Recovers Stolen High Grade

Cobalt—The Kerr Lake has found two new high-grade veins over a width of 8 ft. These veins will probably enter the Crown Reserve ground.

The Mining Corporation has dropped its option on the radium-bearing claims in Butt Township. This company will diamond drill the Foster property in Cobalt, which it has under lease, in order to gain geological information. Steady shipments of mill rock are being made and some high grade has also been found.

Last week $1,500 worth of high grade which had been stolen from the University property of the La Rose was recovered and one of the high graders arrested. There has been a good deal of high grading going on in the camp lately, regularly organized gangs obtaining and disposing of the silver.

The Carr Silver Mines in Carr Township will make a shipment of five tons of ore which is expected to run about 500 ounces a ton. A fair tonnage of high grade mill rock is being broken and a small mill is talked of.

The Tretheway company operating in Gowganda has struck a new vein carrying high grade ore. Ontario smelters which now control the market for Cobalt metal and oxide have raised the price of the metal from $3 to $6 a lb. It remains to be seen if the miners producing the ore will benefit.

Kirkland Lake—Kirkland Lake's August production was $35,261 from 1,281 tons of ore , or an average recovery of $27.50 a ton.

Porcupine—The Vipond mine in Porcupine is to be unwatered, and men are being assembled to start development work.

It is stated that the Associated Gold Fields of Larder Lake is contemplating an increase of capital from $5,000,000 to $30,000,000 on an exchange basis which would leave 10,000,000 shares in the treasury.

Manitoba

Herb Lake—The Bingo Mines, Ltd., have just completed the sinking of a shaft to the 50-ft. level. Another contract has been let to continue the shaft to the 200-ft. level, and also to crosscut at the 100-ft. level. The object of this crosscutting is to determine the value of four veins which appear on the surface within 60 ft. of the main vein.

CALIFORNIA

Plymouth Con. Cuts New Ore—Argonaut Improving Surface Plant

Plymouth—The Plymouth Con. Mining Co. has cut a 12-ft. vein of ore assaying from $10 to $15 per ton on the 3,050-ft. level, and development work so far done on it indicates its likelihood to yield well for some time to come.

Sutter Creek—Drifting north and south from the vein recently cut on the new 3,900 level of the Central Eureka is in progress and ore of good grade is being sent to the mill from this new development. Ore from the 2,700 level is also being profitably milled.

At the Old Eureka (Hetty Green's old property) development work under way on the 3,500 level has uncovered ore of better character than any encountered thus far on other levels since re-opening. The present company has spent a large sum of money in equipping and unwatering and much develop-

ment work has been done. T. C. Gorrie is in charge of operations.

Colfax—The Rising Sun mill has been forced to close until normal power conditions prevail. In the meantime the management is developing the new ore recently cut on six levels.

Scales—Drilling has apparently located the channel on the Poor Boy and Bella Union claims. It will be necessary to tunnel for 3,000 ft. to tap the channel. This will require the installation of compressed air machinery, power plant and other equipment if the plans of the management are to be carried out.

Auburn—Herbert Whittemore, of Newcastle, and E. C. Montgomery, of Auburn, have opened the Old Elizabeth mine near Penryn, which has been closed since 1862.

Jackson—Steady progress is being made at the Argonaut and Kennedy mines in lowering the water. In the meantime the Argonaut is completing extensive improvements at its surface plant. What is practically a new hoist will be installed. The Knight Company, of Sutter Creek, has turned out a large part of this new equipment. All new equipment is at the mine.

Nevada City—The lifting of the ban on the use of electric energy for new mines is awaited with much interest by H. H. Estee, manager of the St. Louis mine, at Willow Valley, who reports that the new mill and the hoist are ready for operating, and that ore on the dump will keep the mill going for two months. The ledge is being developed.

NEVADA

Nenzel Crown Point Holdings To Be Auctioned—Pilot Mill for Eureka Holly

Virginia City—In a winze sunk from the 2,150 level of the Con. Virginia an orebody 5 to 8 ft. wide has been developed for 100 ft. in length, the values running very high, according to Alex Wise, the superintendent.

Simon—A face of good ore was struck in the southwest crosscut on the bottom level of the Simon Silver-Lead mine on Sept. 23, according to a telegraphic announcement sent out by the management. In the initial unit of the reduction plant soon to be erected a combination of wet concentration for the coarse material and oil flotation for the fines is expected to produce the most efficient results. Lloyd White, of Burch, Hershey & White, is consulting metallurgist.

Cortez—The main pipe line of the Consolidated Cortez mine, which extends seven miles to the south of the camp, has been overhauled and an elaborate water supply system installed at the property.

Rochester—All the property of the Nenzel Crown Point Mining Co. is to be sold at public auction on Nov. 17 under a deed of trust given to secure an authorized issue of $300,000 face value first-lien 7-per cent convertible equipment gold notes, the company having defaulted on payment of principal and interest. The Anglo-California Trust Co., of San Francisco, is trustee.

Eureka—It is reported that the Eureka-Holly will erect a small pilot mill at the mine which will be used as an experimental plant to perfect a volatilization process for the treatment of carbonate lead ores. The process has met with success in laboratory tests made by W. H. Layng, the company's metallurgist.

Pioche—Ore shipments from the Pioche district for the week ended Sept. 23 totaled 2,555 tons from following shippers: Prince Consolidated, 1,330 tons; Virginia Louise, 780; Combined Metals, 210; Black Metals, 100; Bristol Silver Mines, 95; and Magnolia, 40.

The recently incorporated Silver Horn Mining Co., with property 23 miles northwest of Pioche, will shortly erect a 30-ton cyanide plant. Material has been purchased and will be on the ground in October.

Earl T. Godbe, who recently had charge of the Pioche Assay Office, has associated himself with Everett Wade of Salt Lake City in the May-Day lease. Work will be confined exclusively to the mine and the lease on the May-Day dumps will be operated by Lee Battles as heretofore.

The Pioche Bristol Mining Co. has levied an assessment of one quarter of one cent per share on all outstanding stock to provide funds for deepening its shaft 100 ft. This assessment will be delinquent Oct. 20, 1920, sales date Nov. 12.

ARIZONA

White Metals Mill at Pioneer Completed—Power Shortage Hampers Operations at Some Bisbee Mines

Kelvin—The No. 1 diamond drill hole of the Ray Boston company is down to 1,415 ft. with 35 ft. to be driven to complete the contract. Since passing the 1,240-ft. mark the work has progressed very slowly due to the bad ground passed through. It is expected that the No. 1 hole will be finished by Oct. 10.

John Cresap has recently opened up a promising vein of gold ore on his claims adjoining the U. S. Vanadium Development Co. A streak a foot wide on the foot wall has yielded some spectacular specimens of free gold. The full width of the vein is nearly two feet. The ore carries silver as well as gold.

Kennard & Bierce, engineers of Los Angeles, have completed the mill for the White Metals Mining Co. at Pioneer. The mill is a modern flotation plant of 50 tons capacity and will treat the ores from what was known in the early mining history of Arizona as the Pioneer mine. J. C. Devine is resident manager.

Morristown—Frank Wright is operating under a lease in certain parts of the original Black Jack workings of the Montzuma mine. High-grade lead-silver ore is being taken out for shipment.

The Plomo King continues the extraction of lead-silver ore for shipment to El Paso. About twenty men are now employed and the newly installed mining equipment is operating satisfactorily.

Sombrero Butte—Surveys for patent have been approved on twelve claims belonging to the Magma Chief Copper Co., in the Bunker Hill mining district.

Bisbee—Operations at several of the outside properties in this district have been curtailed or suspended temporarily because of the lack of electric power. The Bisbee Improvement Co. furnishes electric power to the Boras and Night Hawk Leasing Co., the Shattuck concentrator and other operators. Because of a shortage of fuel oil the power company has been forced to discontinue supplying power and is conserving their small supply of oil for making ice and supplying the city with lights. These properties are therefore shut down. Oil is on the way but it will be several days before conditions will be normal and operations can be resumed.

The Night Hawk Leasing Co. has made a new strike on its 650 level. An important body of carbonate ore running from 10 to 12 per cent copper is being opened up. Development work continues on the 750 level.

The Wolverine & Arizona has not yet completely resumed operations. Some repair work is being done in the mine. Their machinery is being thoroughly overhauled. A cylinder of one of the engines has been sent to El Paso for reboring.

The new sulphide orebody on the Boras Leasing Co.'s 600 level continues to open up. The body is now 60 ft. long and 30 ft. wide and averages about 7 per cent copper. Its vertical extent is not yet known. The fourth monthly disbursement of 10c. per share has recently been made. Production is being maintained at approximately 1,250 tons of 8 per cent copper ore per month.

COLORADO

Mary Murphy Finds Rich Silver Ore—Cripple Creek August Output Averages $13 per Ton

St. Elmo—Recent development work in the Mary Murphy mine has opened an 8-ft. vein of ore assaying high in silver.

Cripple Creek—Lessees Boyle and Duar have opened at a depth of 35 ft., on the Hardwood property of the United Gold Mines Co., a flat vein of high grade gold ore. Four 30-ton carloads of the ore have been shipped recently. The ore runs from $130 to $200 a ton.

The production of Cripple Creek mines for August was 36,991 tons, yielding $477,604, or an average of about $13 a ton for all ore including material from mines and dump.

The Forest Queen will sink its shaft to the 1,000-ft. level. An electric hoist has been installed at the 800-ft. level.

Victor—A small vein of high-grade ore has been opened on the 1,600-ft. level of the Cresson, at a point 700 ft. west of the shaft.

MONTANA

Tuolumne Copper Installing New Pumping Equipment—Anaconda Closes Three Mines

Butte—The Tuloumne Copper Co. is installing pumping equipment which represents pioneer work so far as the use of centrifugal pump under high head in the Butte district is concerned. It is planned to install two 5-stage pumps, connected in series, and driven by a centrally located motor, to pump 500 gal. per min. against a head of 1,200 ft. The pumps are made by the Cameron Pump Co.

The Davis-Daly Copper Co. will raise a new ventilating shaft to connect the 1,700 level with the surface. This shaft will be a noteworthy achievement in point of rapid construction, and will present some novel features in so far as timbering and general design are concerned. It will be about 50 ft. from the main hoisting shaft. It will be driven by raising from several levels at the same time, and will be of circular form and cribbed solid with 8 x 8-in. timber, arranged with the horizontal section octagonal in form. The shaft will have a large cross section in proportion to the frictional resistance to air current, and the proposed system of timbering and lining will be more economical than a rectangular shaft lined with square sets, of equivalent ventilating capacity. James L. Bruce is general manager.

The Tropic, Orphan Girl and East Colusa mines of the Anaconda company have been closed. No appreciable amount of ore has been hoisted from any of these mines in the last few months. The men that had been employed at the three properties have been transferred to other mines.

SOUTH DAKOTA

Dakota, Imperial and Reliance Properties Merged

Deadwood—A consolidation of three of the important mining properties in the Bald Mountain district has been perfected. This merger includes the Dakota, Imperial and Reliance mines. The properties will be operated by the Ofer Mining Co. The acquisition of the Reliance property gives the Ofer company a treatment plant and a total of 700 acres of mineral ground, 500 acres of which is situated in the mineralized section of the district. The Reliance cyanide plant will be remodeled and enlarged. The railroad will be extended from Juno spur to the mill and will greatly facilitate the handling of ores from distant mines. A comprehensive plan of mine development will be undertaken and among other things a working tunnel will be driven to cut the various properties and make possible the removal of most of the ore through one opening. The plans also call for the complete equipment of the entire property with modern machinery.

JOPLIN-MIAMI DISTRICT

Oklahoma-Kansas-Missouri

Goodeagle Mine Near Tar River Sold —Bethlehem Mill To Be Moved From Quapaw to Treece

Treece, Kan.—The Bethlehem Zinc Co. has arranged to move its big mill, located just east of Quapaw, Okla., to a site south of the Tampa mine, west of Treece. At its Quapaw location the mill was operated only a short time, very little ore being produced.

Tar River, Okla.—Temple Chapman has sold the Goodeagle mine to the Hartford Mining Co., Harlan H. White, manager. The consideration is understood to have been approximately $250,000. Shortly before the option was taken a field shaft at the mine had been sunk into unusually good ore. This strike was carefully followed up by the Hartford Co., and a large tonnage of dirt has been hoisted to the surface. There is a good mill on the property.

Hockerville, Okla. — The Federal Smelting & Refining Co. has taken over the Farmington mine, and has made a good producer out of it. The Lucky O. K., its local subsidiary, also recently took a 30-day option on the Acme properties, including two mines and one mill east of Picher, and is testing the ground.

The Empire Development Co. is drilling its tract northeast of the town, while maintaining steady operation.

The Hawkins Mining Co. has opened up a second shaft to the north of the shaft where it recently encountered one of the richest lead deposits opened in the district for many months, and is preparing to move a mill from the Sunnyside camp to this shaft.

MICHIGAN

The Copper District

Michigan Smelting Co. To Instal New Pulverized Coal System—Mill Tailings for Roads

Houghton—The Michigan Smelting Co. at its plant at Coles Creek just west of Houghton have started the erection of a new building in which will be installed the Holbeck pulverized coal system devised and manufactured by the Bonnot Company, of Canton, Ohio. The pulverized coal will be conveyed to the large reverberatory melting and refining furnaces replacing the present use of the best grade of bituminous coal. This is the first of such installations in the copper country of Michigan and is considered a distinct advance in the prevalent metallurgical practice.

Concentrator tailings, locally known as "stamp sand," are being largely used as a highway building material in this vicinity. It is used as a top dressing together with crushed rock in tar and water bond macadam construction for roads subject to heavy traffic. For light traffic country roads the "stamp sand" alone is used. It is especially effective when spread on a clay road bed, the clay acting as a cementing material. It is also largely used as railroad ballast, producing a road bed that is practically dustless. It is also employed as a back-fill in old stopes and is ideal for this purpose in as much as it can be blown into the stopes with compressed air, following South African practice in this respect. The long distance of most of the concentrators from the mines here, involving excessive freight charges, has limited the use of tailings for this purpose.

A rough screen analysis of this material is as follows: All through ⅛-in. or ¼-in. diameter round holes; on 10 mesh, 30 per cent; on 20 mesh, 15 per cent; on 40 mesh, 15 per cent, and through 40 mesh, 40 per cent.

Calumet—The 4th level south drift of the Seneca is within about 40 ft. of the Ahmeek Mining Co.'s boundary. The 5th level plant is being cut preparatory to drifting both north and south on this level.

At the Gratiot shaft the 13th level north drift is 850 ft. from the shaft and about 300 ft. from the Mohawk property line.

Chronology of Mining, September, 1920

Sept. 5—Miners at Virginia City and Gold Hill, Nev., struck for $6 per day. Gold Canyon Dredging Co., Silver City, Nev., started dredging near Dayton, Nev.

Sept. 6 — National Tax Association opened annual convention at Salt Lake City, Utah. Rising Sun Consolidated Mines Co., Colfax, Cal., cut its rich main ledge lost years ago.

Sept. 7—Dome Mines Co. stockholders ratified the purchase of Dome Extension Co.

Sept. 9—International First Aid and Mine Rescue meeting opened at Denver, Col.

Sept. 13—Oklahoma State School of Mines, Miami, Okla., opened for its initial session, Lloyd B. Drake president.

Sept. 16—U. S. Assay Office, New York, damaged by bomb explosion, apparently caused by Reds.

Sept. 20 — Alexander McDougal vs. Oliver Iron Mining Co. suit for infringement of a patent came before Federal Court, Duluth, Minn.

Sept. 27—Ninth annual safety congress of National Safety Council opened in Milwaukee, Wis.

Sept. 28—Annual convention of Independent Oil Men's Association opened in Denver.

THE MARKET REPORT

Daily Prices of Metals in New York

Sept.	Copper	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
30	17.75@18.00	41.25	42.25@42.75	7.15@7.75	7.50	7.50
Oct. 1	17.65@17.80	42.00	42.75@43.00	7.45	7.45	7.45
2	17.40@17.75	41.50	42.75@43.00	7.45	7.45	7.40
4	17.40@17.60	41.50	42.75@43.00	7.40	7.40	7.40
5	17.25@17.50	41.25	42.00@42.25	7.40	7.40	7.40
6	17.25@17.45	41.50	42.50@42.75	7.35	7.35	7.35

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York, cash, except where St. Louis is the normal basing point. All prices are in cents per pound.

Copper is commonly sold on terms "delivered," which means that the seller pays the freight from refinery to buyer's destination. The delivery cost varies, and it would be confusing to figure net prices on individual transactions. Consequently, an average deduction of 0.15c. is made from the "delivered" price to arrive at the New York price. When copper is sold f.o.b. or f.a.s. New York, of course no deduction is made.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c per lb.

Quotations for zinc are for ordinary Prime Western brands. Tin is quoted on the basis of spot American tin, 99 per cent grade, and spot Straits tin.

London

Sept.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3 M		Spot	3 M	Spot	3 M	Spot	3 M
30	94¼	95¼	113	268	274	34½	34⅜	40¾	41⅛
Oct. 1	94¼	95½	111	271½	276½	34⅜	34¼	40¼	41¼
2	...								
4	96¼	96½	111	271¾	277½	34⅝	34¾	40¾	41⅜
5	96⅜	96⅝	111	270	275	34⅝	34⅝	40¾	41⅜
6	97½	97	112	269½	274½	34½	34⅜	40⅝	41¾

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver and Sterling Exchange

Sept.	Sterling Exchange	Silver			Oct.	Sterling Exchange	Silver		
		New York, Domestic Origin	New York Foreign Origin	London			New York, Domestic Origin	New York, Foreign Origin	London
30	346¼	99⅛	92	59⅜	4	348	99½	90⅜	58¼
Oct. 1	347½	99½	91½	59	5	348	99½	89⅝	57⅝
2	348¼	99½	91	58¾	6	350¾	99½	88¾	56⅞

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

On the authority of the Secretary of the Treasury, we quote 100c. per oz. for silver, 1,000 fine, delivered at the option of the Director of the Mint to the New York Assay Office or to the mints in Philadelphia, Denver, or San Francisco, and proved to the satisfaction of the Treasury Department to have been mined, smelted, and refined in the United States. This quotation is retroactive to May 13.

Metal Markets

New York, Oct. 6, 1920

Metal markets for many weeks have been unusually dull, but the week just past was one of those in which quietness was especially emphasized. Practically all producers and consumers report a lack of interest in the metals. Price recessions where they have occurred have failed to induce more business, and, as is usually the case in a falling market, purchasers are refraining from participating more than to cover their immediate requirements. The tendency last week was downward as reflected by our quotations. The prompt market is quiet and little interest is manifested in futures.

Copper

The market was particularly quiet. Producers report few inquiries, as consumers are evidently content to run on a minimum amount of supplies. It takes a particularly strong producing company to withstand the present low prices. The large producers have come down to 18c., delivered, but without being able to negotiate many sales. These are hard times for high-cost copper producers, who, should this condition be maintained, will have to suspend operations. Copper for forward delivery is being quoted at ⅛ to ¼c. below our quotations.

Monthly Average Prices for September

Copper:	
New York Electrolytic	18.144
London Standard	96.381
London Electrolytic	111.905
Lead:	
New York	8.177
St. Louis	8.160
London	35.452
Silver:	
New York, foreign	93.675
New York, domestic	99.500
London	59.476
Sterling Exchange	350.370
Zinc:	
New York	7.717
St. Louis	7.661
London	39.690
Tin:	
99 per cent	41.940
Straits	44.465
London	270.120
Antimony	7.113
Quicksilver	75.000

Lead

It has been conservatively estimated that some 18,000 tons of pig lead entered the United States during September, causing the recent recession in the market. Producers are "catching up" in their shipments, but only a small number of inquiries are coming in. In fact, since the first of the month the market has been exceptionally dull, despite the fact that neither consumers, producers, nor dealers have excess stocks to speak of. Consumption in paint, cable and foil manufacture is good, but pipe and battery consumption has fallen off. The price of lead is now close to that of zinc, and the abnormal disparity between the two metals is disappearing. Spot lead is in little demand. Futures are nominal.

Zinc

Demand from galvanizers has picked up and there has been an increased activity in the market but only at decreased prices. Although zinc is in an excellent statistical position in the United States, the influence of the European market is important, as the United States cost of producing spelter is a secondary consideration with those countries which want to literally convert all their marketable zinc into gold.

Tin

Sales have been made below import costs, little interest is exhibited in futures, and there have been heavy losses in the forced liquidation of speculative tin supplies.

Straits tin for future delivery: Sept.

30th, 43.25@43.50; Oct. 1st, 43.50@44.00; 2nd, 43.50@43.75; 4th, 43.75@44.00; 5th, 43.25@43.50; 6th, 43.50@43.75.

Arrivals of tin in long tons: Sept. 28th, Singapore, 75; 30th, Singapore, 575; total arrivals for the month of September, 5,335 tons; Oct. 1st, Penang 50; 4th, Singapore, 600; London, 350.

Silver

The silver market since our last report has continued to drop, owing to the weakness of Eastern exchanges, and at the close the tendency is still weak. It has been reported that shipments of Indian rupees have been made to China. Purchases of silver to date by the U. S. Government under the Pittman Act amount to about 18,000,000 oz.

Mexican Dollars—Sept. 30th, 70¼; Oct. 1st, 69¾; 2nd, 69½; 4th, 68¾; 5th, 68; 6th, 67⅛.

Gold

Gold in London on Sept. 30th, 118s. 4d.; Oct. 1st, 118s. 4d.; Oct. 4th, 118s.; Oct. 5th, 117s. 10d.; Oct. 6th, 117s. 1d.

Foreign Exchange

The European exchange market continues to be steady and fluctuations are relatively small. On the whole the market showed a slight downward tendency. On Tuesday, Oct. 5th, francs were 6.68c.; lire, 4.03c.; and marks, 1.59c. New York funds in Montreal, 9 per cent premium.

Other Metals

Aluminum—For 50-ton lots: ingot, 99 per cent and purer, 35c.; 98@99 per cent, 34.8c. Virgin metal still obtainable in open market at about 32.5c. for 98@99 grade.

Antimony—Spot metal, 7c. per lb. Cookson's "C" grade, 12½@13c. Chinese and Japanese brands, 7c. W. C. C. brand, 8½@9c. Chinese needle antimony, lump, firm at 7@7½c. per lb. Standard powdered needle antimony (200 mesh), 9½c. per lb. Market dull.

White antimony oxide, Chinese, guaranteed 99 per cent Sb_2O_3, wholesale lots, 10c.

Bismuth—$2.55 per lb., 500-lb. lots, and $2.57 per lb., 100-lb. lots.

Cadmium—Nominal, $1.40@$1.50 per lb. Market steady.

Cobalt—Metal, $6 per lb.; black oxide, $4.10 per lb.; sulphate, $1.60.

Iridium—Nominal, $350@$400 per oz.

Magnesium—Crude, 99 per cent or over pure, $1.75 per lb. for the metal in 100 lb. lots and over, f.o.b. Niagara Falls.

[1]**Molybdenum Metal** in rod or wire form, 99.9 per cent pure, $32@$40 per lb., according to gage.

Nickel—Ingot, 43c.; shot, 43c.; electrolytic, 45c., f.o.b. Bayonne, N. J.

Monel Metal—Shot, 35c.; blocks, 35c., and ingots, 38c. per lb., f.o.b. Bayonne.

Osmium—Open market, $50@$75 per troy oz.

Palladium—$100 per oz.

Platinum—Firm at $105 per oz.

Quicksilver—Market quiet; $72 per 75-lb. flask. San Francisco wires $73@$75. Market weak.

Ruthenium—$200@$220 per troy oz.

[1]**Selenium**—Black powdered, amorphous, 99.5 per cent pure, $2@$2.25 per lb. Demand strong.

[1]**Thallium Metal**—Ingot, 99 per cent pure, $20 per lb.

[1]**Tungsten Metal**—$35@$60 per kilogram, according to purity and gage.

Metallic Ores

Bauxite—About 52 per cent alumina content, less than 2 per cent iron oxide, up to 20 per cent silica and artificially dried to contain not more than 4 per cent free moisture, $10 per gross ton at mine; 54 per cent alumina and about 15 per cent silica, $11; averaging 57 per cent alumina, 8 to 12 per cent silica, less than 3 per cent iron oxide, $13 on basis of 8 per cent free moisture.

Chrome Ore—Guaranteed 50 per cent Cr_2O_3 foreign ore with a maximum of 6 per cent silica, 75@85c. per unit, New York. California concentrates, 50 per cent Cr_2O_3 and upward, 70@75c.

Manganese Ore—60@70c. per unit, seaport; [1]chemical ore (MnO_2) $70@$90 per gross ton, lump; $80@$100 per net ton, powdered.

Molybdenum Ore—85 per cent MoS_2, 70@75c. per lb. of contained sulphide, New York.

[1]**Tantalum Ore**—Guaranteed minimum 60 per cent tantalic acid, 55@65c. per lb. in ton lots.

[1]**Titanium Ores**—Ilmenite, 52 per cent TiO_2, 1¼@2c. per lb. for ore. Rutile, 95 per cent TiO_2, 15c. per lb. for ore, with concessions on large lots or running contracts.

Tungsten Ore—Scheelite, 60 per cent WO_3 and over, per unit of WO_3, $6 f.o.b. mines; wolframite, 60 per cent WO_3 and over, per unit of WO_3, $4.50@$5, in New York.

Uranium Ore (Carnotite)—$2.75@$3 per lb. for 96 per cent of the contained oxide (U_3O_8). Ores must contain a minimum of 2 per cent U_3O_8.

Vanadium Ore—$1.25 per lb. of V_2O_5 (guaranteed minimum of 11 per cent V_2O_5), New York.

[1]**Zircon**—Washed, iron free, 5c. per lb.

[1]**Zirkite**—According to conditions, $70@$90 per ton, carload lots. Pure white oxide, 99 per cent, is quoted at $1.15 per lb. in ton lots.

Zinc and Lead Ore Markets

Joplin, Mo., Oct. 2—Zinc blende, per ton, high, $48.40; basis 60 per cent zinc, premium, $44; Prime Western, $42.50; fines and slimes, $42.50@$40; calamine, basis 40 per cent zinc, $35@$30. Average settling prices: Blende, $45.04; calamine, $32.92; all zinc ores, $44.08.

Lead, high, $98.30; basis 80 per cent lead, $80@$75; average settling price, all grades of lead, $93.40 per ton.

Shipments for the week: Blende, 14,431; calamine, 275; lead, 1,978 tons. Value, all ores the week, $843,670.

[1]Furnished by Foote Mineral Co., Philadelphia, Pa.

It is admitted that 1,000 tons of Prime Western blende was purchased on Monday, $45 basis, yet buyers assert it was a purchase on last week's market. Another decline in lead totals a decrease of $37.50 in four weeks. Much of the lead now loading out was sold on $100@$112.50 basis. Purchases on the lower basis offerings of the last three weeks are smaller each week. Sellers claim they cannot produce ore in the face of a continued lowering of the market.

The Van Buren smelter was closed Oct. 1 by a walkout of smeltermen. A repetition is looked for at Fort Smith Tuesday and Wednesday.

Six agencies bought no ore this week, the purchase dropping to 7,500 tons, against 11,500 tons last week.

Platteville, Wis., Oct. 2—Blende, basis 60 per cent zinc, $49.25 base for high grade. Lead ore, basis 80 per cent lead, $80 per ton. Shipments for the week: Blende, 1,276; calamine, 30; lead, 50 tons. Shipments for the year: Blende, 52,602; calamine, 2,459; lead, 4,298; sulphur ore, 1,241 tons. Shipped during the week to separating plants, 2,383 tons blende.

Non-Metallic Minerals

Asbestos—Crude, No. 1, $2,000@$3,000; No. 2, $1,400@$1,700; spinning fibres, $400@$800; magnesia and compressed sheet fibres, $325@$400; shingle stock, $110@$150; paper stock, $60@$75; cement stock, $17.50@$30; floats, $8.50@$15, all per short ton, f.o.b. Thetford, Broughton, and Black Lake mines, Quebec, Canada; 5 per cent to be added as Canadian royalty export sales tax.

Barytes—Crude, 88 to 94 per cent barium content, $10@$12 per net ton; ground (white) $24@$30 in bags, carload lots; (off-color) $22@$26 in bags, carload lots; all f.o.b. Kings Creek, S. C. Crude, 88 to 94 per cent, $12 per gross ton; ground (white) $23@$25; ground (off color) $16@$19 per net ton, f.o.b. Cartersville, Ga. Crude, 88 to 94 per cent, $23; ground (white) $45; ground (off color) $30@$32 per net ton, less than carload lots, f.o.b. New York. Crude, not less than 98 per cent, $11@$11.25 per ton, f.o.b. cars, Missouri; floated, $28 per ton in bbls.; $26.50 per ton in 100-lb. bags; extra charge for bags, f.o.b. St. Louis.

Chalk—Domestic, extra light, 5@6c. per lb.; light, 4½@5½c.; heavy, 4@5c; English, extra light, 5@7c.; light, 5@6c.; dense, 4½@5c. per lb., all f.o.b. New York.

China Clay (Kaolin)—Crude, $9@$12; washed, $12@$15; powdered, $18@$22; bags extra, per net ton, f.o.b. mines, Georgia; crude, $8@$12; ground, $15@$40, f.o.b. Virginia points. Domestic lump, $10@$20; powdered, $25@$30; imported lump, $25@$35; powdered, $30@$60, f.o.b. New York.

Feldspar—Crude, $8@$18 per gross ton, f.o.b. Maryland and North Carolina points; $7.50@$10, f.o.b. Maine; ground, $30@$35, car lots, f.o.b. Baltimore; ground, $17@$21, f.o.b. North Carolina points; $17@$21 per ton, No. 1 ground, f.o.b. New York State; $21@

$23 per ton, ground, f.o.b. Maine. Crude spar very scarce.

Fluorspar — Gravel, guaranteed 85 per cent calcium fluoride and not over 6 per cent silica, $25 per ton, f.o.b. Illinois mines, and $27.50, f.o.b. Kentucky; ground, suitable for acid, chemical or enameling purposes, $60; lump, $17.50, f.o.b. Tonuco, N. M.

Graphite—The 90 per cent crucible grade is held in Alabama for 9c. per lb. and 85 per cent grade is practically unobtainable, prices being 7@9c. The higher lubricating grades sell for 11@40c., according to carbon content. In Ceylon, some of the largest producers have closed their mines until prices advance to meet increased production costs, and stocks at Colombo were lowered only 3,000 tons in the first five months of 1920. Surplus stocks on Jan. 1 amounted to 20,000 tons.

Gypsum—Plaster of Paris in carload lots sells for $4.25 per 250-lb. bbl., alongside dock, New York.

Kaolin—See China Clay.

Limestone—Dolomite, 1@2 man size, $1.60@$1.65; 2@8 in., $1.55@$1.65 per net ton, f.o.b. Plymouth Meeting, Pa.; fluxing, $1.65@$1.75 per net ton, f.o.b. Howellville, Pa.

Magnesite, Calcined — High-grade caustic calcined, lump form, $35@$40 per ton, carload lots, f.o.b. California points. Freshly ground calcined, suitable for flooring trade, $75@$85 per ton, f.o.b. Eastern points.

Dead-Burned — $32.50 per net ton, Chewelah, Wash.; $52@$58, Chester, Pa. Austrian grade, $52@$55 per ton, f.o.b. Baltimore. (Magnesite brick—See Refractories.)

Mica—India block mica slightly stained, per lb.: No. 6, 50c.; No. 5, $1.20@$1.40; No. 4, $2@$3; No. 3, $4.25@$5; No. 2, $5.50@$7; No. 1, $8. Clear block: No. 6, 55c.; No. 5, $2; No. 4, $4; No. 3, $5.75; No. 2, $7; No. 1, $9; A1, $14; extra large, $25, all f.o.b. New York; ground, $100@$150 per ton, Philadelphia. Domestic, uncut, f.o.b. Franklin, N. C., as follows: Scrap, $45@$50 per ton; punch, 4@5c. per lb.; circle, 15@25c.; 1½ x 2 in., 75c.; 2 x 2 in., $1.15; 2 x 3 in., $1.65; 3 x 3 in., $2.10; 3 x 4 in., $2.50; 3 x 5 in., $2.75; 3 x 6 in., $3.75; ground 165 mesh, $240 per ton; ground roofing mica, $60; mica washers, 75c.@$2 per lb.; 1¼-in. disks, No. 1, $1.60 per lb.; No. 2, $1.30.

[1]**Monazite** — Minimum of 6 per cent thorium oxide, $35 per unit, duty paid.

Phosphate Rock—Per long ton, Florida ports: 77 per cent tricalcium phosphate, $13; 75 per cent, $11.50; 75@74 per cent, $11; 70 per cent, $8.35; 68 per cent, $7.85; 68@66 per cent, $7.60. There is no price schedule for spot for domestic uses. Tennessee production sold up months ahead.

Pumice Stone—Imported, lump, 4@50c. per lb.; domestic lump, 6c.; ground, 4@7c., all f.o.b. New York.

Pyrites—Spanish fines, per unit, 12c., c.i.f. Atlantic seaport; furnace size, 17c.; Spanish lump, 14@16c.; domestic fines, f.o.b. mines, Georgia, 12@14c. Market improving.

Quartz—(Acid tower) fist to head, $10; 1¼ to 2 in., $14; rice, $17, all net ton, f.o.b. Baltimore; lump, carload lots, $5@$7.50 net ton, f.o.b. North Carolina mines. F.o.b. Wausau, Wis., the price is $16 per ton in car lots, and $22 in less quantities, including bags.

Sand (Glass)—Dry glass sand, $4 per net ton, f.o.b. cars Mapleton, Pa. Sand, f.o.b. Ottawa, Ill., is $3 per ton; $2.50 on annual contracts. Sand at Klondike. Gray Summit and Pacific, all in Missouri, is $2.50 on contract; some outside sales have been made at $4.

Sulphur—$18 per ton for domestic; $18@$20 for export, f.o.b. Texas and Louisiana mines. Market quiet.

Talc — Paper making, $12@$22 per ton; roofing grades, $9.50@$15; rubber grades, $12@$18, all f.o.b. Vermont. California talc, $20@$45, talcum powder grade. Southern talc, powdered, carload lots, $12@$15 per ton; less than carload, $25, f.o.b. cars; freight to New York $5.25 per ton, carload lots; less than carload lots, $9.25. Imported, $60@$70; Canadian, $20@$40 per ton.

Mineral Products

Arsenic—White arsenic, 15½c. per lb.; sulphide, powdered, 20@21c. per lb., f.o.b. works, carload lots.

Nitrate—Soda, $3.85 per cwt., ex vessel, Atlantic ports. Market quiet.

Potassium Sulphate—Domestic, $225@$250 per net ton, basis 90 per cent, f.o.b. New York.

Ferro Alloys

Ferrocarbontitanium—For 15 to 18 per cent material, $200@$250 per ton, f.o.b. Niagara Falls, N. Y.

Ferrocerium—Per lb., $12@$15. Foreign conditions as affecting the price of American goods remain unchanged.

Ferrochrome—Carload lots, spot and contract, 60 to 70 per cent chromium, 6 to 8 per cent carbon, 18½@19c. per lb. of chromium contained; 4 to 6 per cent carbon, 19@20c., f.o.b. works.

Ferromanganese—For 76 to 80 per cent, prompt delivery, $170@$180, freight allowed; last half, $170; English, $170, c.i.f. Atlantic seaports. Spiegeleisen, 18@22 per cent, $82.50@$85, f.o.b. furnace.

Ferromolybdenum[1]—Standard grades, carrying from 50 to 60 per cent molybdenum metal, with low sulphur, phosphorus, and arsenic, $2@$2.50 per lb. of contained metal, f.o.b. works.

Ferrosilicon—For 10 to 15 per cent, per gross ton, f.o.b. works, $60@$65; 50 per cent, $82.50@$85; 75 per cent, $150@$160.

Ferrotungsten—70 to 80 per cent W, 90c.@$1.05 per lb. of contained tungsten, f.o.b. works.

Ferro-uranium—35 to 50 per cent U, $7 per lb. of U contained, f.o.b. works.

Ferrovanadium[1]—Basis 30 to 40 per cent, $6.50@$8.50 per lb. of V contained, f.o.b. works.

[1]Furnished by Foote Mineral Co., Philadelphia, Pa.

Metal Products

Copper Sheets — Current New York price, 29½c. per lb.; wire, 22½@23c.

Lead Sheets—Full lead sheets, 11c.; cut lead sheets, 12½c. in quantity, mill lots.

Nickel Silver—Unchanged at 39½c. per lb. for 18 per cent nickel.

Yellow Metal — Dimension sheets, 26½c.; sheathing, 25½c.; rods, ⅜ to 3 in., 23½c.

Zinc Sheets—$12.50 per 100 lb., less 8 per cent on carload lots, f.o.b. smelter; zinc plates, 12c. per lb.

Refractories

Bauxite Brick—56 per cent alumina, $160 per 1,000, f.o.b. Pittsburgh.

Chrome Cement—40@45 per cent Cr_2O_3, $55@$60 per net ton, and $65 in sacks, carload lots, f.o.b. eastern shipping points.

Fire Clay—First quality, 9-in. shapes, $55@$60 per 1,000, Pennsylvania, Ohio and Kentucky. Second quality, $45@$50.

Magnesite Brick — 9-in. straights, $110 per net ton; 9-in. arches, wedges and keys, $121; soaps and splits, $134.

Silica Brick—9-in., per 1,000: Chicago district, $65@$70; Birmingham, Ala., $56@$61; Mount Union, Pa., $55@$60.

Iron Trade Review

Pittsburgh, Oct. 5, 1920

In a few instances mills have slightly decreased operations on account of customers requiring less steel than was formerly shipped to them, but as to the great bulk of the steel industry, production has been increasing, on account of better transportation and weather conditions, and it is possible that this month's steel output will break the record that has stood since October, 1918.

Finished-steel prices are not declining to any extent. Special premiums for prompt shipment have disappeared, but the independent market generally is almost as far above the Steel Corporation price schedule as at any other time. The strength of sheets is particularly noteworthy, they being $50@$60 a ton above the Steel Corporation prices, at about 6.75@7c. for black sheets and 8.50@9c. for galvanized.

Pig Iron—The market is so sluggish that it is not developing the new and lower prices that must come on account of changed conditions. Bessemer and basic remain nominally quotable at $48.50, Valley, although buyers will no longer pay the price. It is reported that two steel interests have offered basic at $45.96, delivered Pittsburgh, or $44, Valley equivalent; also that a middleman has sold over a thousand tons at only a shade above this figure.

Steel—Nominal mill quotations are $60 for billets and $65 for sheet bars, but it is believed $5 under this could be done on a firm bid.

Charcoal and Coke

Charcoal—Willow, 7c. per lb. in bbls.; hardwood, 6c. per lb., in 250-lb. bbls.

Connellsville — Furnace, $16.50@$17; foundry, $18.

The Price of Zinc

We have been much interested in the comment on our zinc prices for the week ending Sept. 29 which has been made by the editor of the *American Metal Market*. We are glad to mention the subject at greater length because we have found this publication to be one of the most reliable and honest of the journals devoted to the marketing of metals. The prices quoted by *American Metal Market* are likely to be somewhat higher than ours, but we believe that this is because they represent, in general, small lots, and because those responsible for their compilation are not always in the position to be advised of the actual prices at which large tonnages are marketed. Wholesale prices, as we might call them, are naturally lower than retail.

The editor of the *American Metal Market* in his issue of Sept. 30 questions our prices as being too low and takes us to task for being unwarrantably bearish in our attitude. In his issue of Oct. 1, he is more inclined to dismiss the first charge, for he admits that "there are reports that a certain interest has indicated a willingness to sell Prime Western at 7.50c., St. Louis basis." These interests, we might add, were not only willing to sell but did sell a considerable tonnage at that figure, and it was upon these sales that our quotation was based. Then follows an intimation that the dull demand was brought about by our report of a leading producer who predicted 7c. zinc. We believe the demand is no duller than it has been for some time. If it *is* quieter, we feel flattered that any comment of ours should have so serious an effect on the market. We wish that our optimism on copper a few months ago had had a better effect on the demand for that metal. The editor has also been inquiring about to find out who predicted 7c. zinc. In this, of course, he was unsuccessful, although it was not because he did not write to the proper people. The man who made the prediction naturally does not care to make himself known.

The reason zinc is being pushed down, if it is being pushed down, and not just falling down, as a result of the old law of supply and demand, we suspect is because domestic producers are doing their best to keep foreign metal out of this country. If this is the case, it would probably redound to the advantage of the domestic zinc industry in the long run. If importers lose money they will hesitate about trying the same game again. If we could control things, we would boost up the prices on all metals: it would result in better times for our clientele and, therefore, more profit to ourselves.

This matter brings up the subject as to whether we should abstain from publishing all bearish reports and always be sunny and optimistic regarding the future; or, if not that, at least keep still. This is small-town stuff. We consider it our duty to publish the market gossip as we get it, even though our informants have long black hair and claws. We believe that our metal industry generally has progressed beyond the stage where it must be fed on sugar-coated pills.

Japan's Mineral Production

According to figures published by the Tokyo Chamber of Commerce, the output of minerals from the leading Japanese mines for the first four months of the year was generally lower than for the same period of 1919, with the exception of coal, the figures being as follows:

	1919	1918
Gold (momme)	613,411	677,504
Silver (momme)	13,518,115	17,567,640
Copper (kin)	41,475,533	46,056,032
Iron (kin)	22,450	29,249
Coal (ton)	8,538,245	8,261,462
Petroleum (koku)	608,209	690,832
Sulphur (kin)	12,146	23,237

A momme is the equivalent of .008267 lb.; a kin is 1.323 lb.; and a koku is the Japanese denomination of liquid capacity or 39.7033 gal.

Foreign Trade in Metals and Ores for July

Imports and exports of the more important metals and ores, as reported by the Department of Commerce for July, 1920, and the figures for July, 1919, as finally revised, are as follows:

IMPORTS, JULY, 1919, AND 1920
(In pounds, unless otherwise stated)

	July, 1919	July, 1920
Antimony ore, contents	226,246	152,720
Antimony matte, regulus or metal	1,219,458	2,267,058
Copper:		
Ore, contents	4,756,444	1,389,399
Concentrates, contents	2,902,900	2,548,425
Matte, regulus, etc., contents	5,758,470	123,607
Imported from (in part):		
Canada	3,610,480	1,030,824
Mexico	4,029,810	2,606,275
Chile	3,186,163	359,758
Unrefined, black, blister, etc	18,033,812	14,781,480
Refined, in bars, plates, etc	3,116,315	7,938,249
Composition metal, copper chief value	12,177	525,391
Lead:		
Ore, contents	2,711,964	1,346,980
Bullion, contents	12,575,262	9,971,247
Imported from (in part):		
Canada	1,376,588	458,079
Mexico	12,758,243	8,386,023
Chile	385,878	11,042
Pigs, bars, and old	561,053	2,305,038
Manganese ore, long tons	15,585	18,447
Imported from (in part):		
Brazil	9,750	12,462
British India	None	1,600
Tungsten ore, long tons	452	71
Pyrites, long tons	63,088	56,753
Imported from (in part):		
Spain, long tons	36,099	34,874
Canada, long tons	24,889	21,879
Tin ore, long tons	1,975	1,938
Tin bars, blocks, pigs, etc	113,120	17,584,167
Imported from (in part):		
United Kingdom	None	4,029,725
China	None	167,881
Straits Settlements	113,120	10,097,914
Hongkong	None	2,318,059
Zinc:		
Ore, contents	4,225,849	1,974,322
Imported from (in part):		
Canada	196,515	164,955
Mexico	2,160,540	1,802,826
Blocks or pigs, and old	None	18

EXPORTS OF COPPER, LEAD AND ZINC
(In pounds)

	July, 1919	July, 1920
Copper:		
Ore, contents	3,000	392
Concentrates	None	None
Unrefined, black, blister, etc	3,600	83,277
Refined, in ingots, bars, etc	42,373,791	40,051,623
Exported to (in part):		
France	13,917,000	17,797,752
Belgium	.....	536,638
Germany	.....	5,634,824
Netherlands	.....	191,463
Sweden	7,008,518	3,465,284
United Kingdom	7,676,212	9,200,750
Canada	1,406,066	1,523,997
Japan	7,592,248	940
Composition metal, copper chief value	25,408	6,972
Pipes and tubes	334,563	444,316
Plates and sheets	436,843	2,522,007
Wire, except insulated	6,208,843	3,647,668
Lead:		
Pigs, bars, etc.:		
Produced from domestic ore	637,855	171,202
Produced from foreign ore	4,664,547	574,595
Exported to (in part):		
France	.....	493,315
United Kingdom	3,472,560	112,089
Canada	119,650	13,280
Zinc:		
Dross	72,000	5,980
Spelter:		
Produced from domestic ore	18,715,545	16,196,507
Produced from foreign ore	1,103,124	863,622
Exported to (in part):		
France	5,683,424	3,992,888
Italy	112,000	67,238
United Kingdom	11,442,341	10,678,762
Canada	340,694	14,512
In sheets, strips, etc	1,978,580	3,082,276

Algerian Mineral Exports

Mineral exports from Algeria last year were as follows, according to the *Mining Journal*, London, the figures for 1918 being given by way of comparison:

	Metric Tons, 1918	Metric Tons, 1919
Antimony ore	7,920	2,160
Copper ore	.....	1,000
Iron ore	759,217	782,885
Lead ore	17,831	8,316
Zinc ore	29,288	4,261
Mercury (native)	15	8
Natural phosphates	198,539	242,186
Superphosphates	4,852	14,576

METAL STATISTICS

Monthly Average Prices of Metals

Silver

	New York			London		
	1918	1919	1920	1918	1919	1920
January	88.702	101.125	132.827	44.356	48.438	79.846
February	85.716	101.125	131.295	42.792	48.027	85.005
March	88.082	101.125	125 551	43.620	48 171	74.194
April	95.346	101.125	119 779	47.215	48.886	68.848
May	99.505	107.135	102 585	48.980	52.104	60.010
June	99.500	110.430	90 957	48.875	53.896	51.096
July	99.625	106.394	91 971	48.813	54.133	53.736
August	100.292	111.370	96.168	49.077	58.835	59 875
September	101.125	114.540	93.675	49.500	61.668	93 6 5
October	101.125	119.192	.....	49.500	64.049	.....
November	101.125	127.924	.....	48.969	70.065	.....
December	101.125	131.976	.....	48.492	76.432	.....
Year	96.772	111.122	.....	41.516	57.059	.....

New York quotations cents per ounce troy, 999 fine. London, pence per ounce, sterling silver, 925 fine.

Copper

	New York Electrolytic		London Standard		London (*b*) Electrolytic	
	1919	1920	1919	1920	1919	1920
January	(*a*)	18.918	92.238	118.095	106.619	123.238
February	16.763	18.569	78.700	120.188	95.700	126.950
March	14.856	18 331	76.821	109.533	82.071	118.348
April	15.246	18.660	77.300	103 025	82.200	111 500
May	15 864	18 484	77.767	96 750	81.227	109.200
June	17.610	18.065	83.062	87.864	85.900	101.909
July	21.604	18.576	99.576	90.148	103.046	106.455
August	22.319	18.346	97.300	93.935	106.429	111.143
September	21.755	18.144	100.767	96.381	.....	111.905
October	21.534	.....	103.418	.....	.....	.....
November	19.758	.....	98.894	.....	.....	.....
December	18.295	.....	103.708	.....	.....	.....
Year	18.691	.....	90.796	.....	.....	.....

(*a*) No market. (*b*) See note on page 743.

Lead

	New York		St. Louis		London	
	1919	1920	1919	1920	1919	1920
January	5.432	8.561	5.316	8.300	37.227	47.095
February	5.057	8.814	4.784	8.601	28.675	50.256
March	5.226	9 145	4.992	8 894	27.952	46 054
April	4.982	8.902	4.722	8.618	24.888	39.225
May	5.018	8.576	4.773	8.352	23.852	38.488
June	5.340	8.323	5.070	8.169	22.544	34.330
July	5.626	8.338	5.408	8.283	23.457	34.960
August	5.798	8.687	5.583	8.725	25.330	36.304
September	6.108	8.177	5.853	8 160	28.473	35.452
October	6.487	.....	6.249	.....	34.731	.....
November	6.808	.....	6.649	.....	41.202	.....
December	7.231	.....	6.955	.....	...	.....
Year	5.759	.....	5.530	.....	28.590	.....

Tin

	New York 1919		New York 1920		London	
	99%	Straits	99%	Straits	1919	1920
January	67.702	.....	61.596	.....	248.557	376.512
February	66.801	.....	58.466	59.932	223.963	395.750
March	67.934	.....	61.037	61.926	236.843	369.489
April	72.500	.....	61.120	62.115	225.275	345.450
May	72.500	.....	53.230	55.100	234.398	294.813
June	71.240	.....	46.125	48.327	238.263	250.614
July	68.000	.....	45.798	49.154	253.272	261.886
August	57.226	.....	43.856	47.620	273.625	274.048
September	54.482	.....	41.940	44.465	280.102	270.120
October	54.377	.....	.....	.....	279.239	.....
November	53.307	.....	.....	.....	283.556	.....
December	53.870	.....	.....	.....	314.113	.....
Year	63.328	.....	.....	.....	257.601	.....

Zinc

	New York		St. Louis		London	
	1919	1920	1919	1920	1919	1920
January	7.272	9.483	6.922	9.133	56.045	58.643
February	6.623	9.058	6.273	8.708	46.150	61 338
March	6.500	8 881	6.150	8 531	38.500	53 467
April	6.465	8 534	6.114	8.184	36.118	47.388
May	6.429	7.938	6.079	7 588	35.477	45.088
June	6.901	7.815	6.551	7.465	36.763	41.193
July	7.873	8.070	7.523	7.720	41.815	41.886
August	7.789	8.185	7.160	7 835	39.338	41.220
September	7.510	7.717	7.473	7.661	40.955	39.690
October	7.823	.....	7.827	.....	43.630	.....
November	8.177	.....	8.350	.....	46.588	.....
December	8.700	.....	8.350	.....	53.101	.....
Year	7.338	.....	6.988	.....	42 879	.....

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Pig Iron, Pittsburgh

	Bessemer ‡		Basic ‡		No. 2 Foundry	
	1919	1920	1919	1920	1919	1920
January	$33.60	$40.47	$31.40	$39.88	$32.40	$39.86
February	33.60	42.95	31.40	42.61	32.40	43.40
March	32.54	43 40	31.40	42 90	29 12	43 40
April	29.35	43.72	27.15	44.22	28.15	43.90
May	29.35	44 00	27.15	44 88	28.15	45 36
June	29.35	44 89	27.15	45 41	28.15	46 40
July	29.35	47.21	27.15	47.42	28.15	46.56
August	29.35	48.90	27.15	49.88	28.15	49.35
September	29.35	50.46	27.15	50.46	28.15	51.96
October	29.35	.....	27.15	.....	28.30	.....
November	31.60	.....	31.56	.....	32.16	.....
December	36.57	.....	35.32	.....	36.86	.....
Year	$31.11	.....	$29.26	.....	$28.35	.....

‡ As reported by W. P. Snyder & Co.

Antimony, New York; July, 7.500c., August, 7.177c., September, 7.113c.
Quicksilver, New York; July, $90.333, August, $85.355, September, $75.000.

Monthly Copper Production

The crude-copper content of blister copper of the principal producers, in pounds, for May-August, 1920, follows:

MONTHLY CRUDE COPPER PRODUCTION, 1920

	May	June	July	August
Alaska shipments	7,331,590	7,213,820	5,797,645	5,762,551
Arizona:				
Arizona Copper	3,000,000	3,000,000	3,000,000	3,000,000
Calumet & Arizona	4,760,000	4,764,000	4,232,000	5,200,000
Cons. Ariz. Smelting	1,250,000	940,000	750,000	975,000
Inspiration	7,500,000	7,300,000	6,500,000	7,200,000
Magma	918,321	755,601	865,774	556,765
Miami	5,054,760	4,400,000	4,549,298	4,630,720
New Cornelia	3,720,000	3,664,000	3,522,000	3,842,000
Old Dominion	2,287,400	2,999,000	2,640,000	2,802,000
Phelps Dodge	6,761,000	6,125,000	5,955,000	5,875,000
Shattuck Arizona	219,118	198,327	166,938	194,003
Ray	4,260,000	4,520,000	4,500,000	4,505,000
United Verde	5,400,000	5,880,000	5,085,140	5,125,000
United Verde Extension	3 219,934	2,828,020	3,304,878	5,805,568
Michigan:				
Calumet & Hecla	8,803,811	9,022,879	8,312,025	7,520,107
Other Lake Superior	6,200,000	6,200,000	6,200,000	6,000,000
Montana:				
Anaconda	9,700,000	12,700,000	11,700,000	11,800,000
East Butte	1,412,760	1,396,140	1,537,880	1,566,800
Nevada:				
Nevada Cons	4,350,000	4,650,000	4,650,000	4,650,000
New Mexico:				
Chino	3,930,728	4,010,069	4,360,932	4,000,140
Utah:				
Utah Copper	9,904,781	10,000,000	8,500,000	4,820,000
Eastern Smelters	1,600,000	1,600,000	1,600,000	1,600,000
Total reported	101,584,207	104,166,856	97,729,510	101,430,654
Others, estimated	13,380,000	12,000,000	12,000,000	15,000,000
Total United States	114,964,207	116,107,856	109,729,510	116,430,654
Imports: Ore and concentrates, etc	1,607,003	35,911,009	3,937,824	.....
Imports in blister, etc	43,253,540	15,019,398	26,553,600	.....
Grand total	168,824,750	167,638,263	140,220,934	.....
British Columbia:				
Granby Cons	2,131,219	2,079,000	2,400,000	2,471,200
Mexico:				
Boleo	650,908	802,474	781,613	618,390
Cananea	4,300,000	3,750,000	3,500,000	3,500,000
Phelps Dodge Mexican properties	1,141,000	1,427,000	2,402,000	2,490,000
Other foreign:				
Cerro de Pasco	3,890,000	3,944,000	3,652,000	4,440,000
Chile	10,300 000	7,500,000	9,904,000	10,640,000
Katanga	3,847,027	4,223,221	.....	.....
Backus & Johnston	1,720,000	1,382,000	1,458,000	.....

Domestic copper production for 1918, 1919, and part of 1920 follows:

	1918	1919	1920
January	165,431,568	135,733,511	121,903,744
February	160,011,364	111,649,512	117,450,000
March	185,525,168	102,040,460	120,301,316
April	163,207,096	98,808,998	116,078,871
May	181,070,350	92,652,975	114,964,207
June	166,723,599	95,856,570	116,107,856
July	159,329,031	100,369,247	109,729,510
August	165,550,799	107,994,040	116,430,654
September	157,992,487	108,703,075	.....
October	168,638,775	115,143,143	.....
November	159,217,588	117,289,735	.....
December	161,801,916	102,997,633	.....

MINING STOCKS

Week Ended October 2, 1920

Stock	Exch.	High	Low	Last	Last Div.	
COPPER						
Adventure	Boston	...	...	*50		
Ahmeek	Boston	57	56½	57	Sept. '20, Q	.50
Alaska-B.C.	N. Y. Curb.	⅛	⅛	⅛		
Allouez	Boston	23½	23½	23½	Mar. '19,	1.00
Anaconda	N. Y.	53½	51½	57½	Aug. '20, Q	1.00
Ariz. Com'l	Boston	9	9	9	Oct. '18,	.50
Big Ledge	N. Y. Curb.	⅛	⅛	⅛		
Bingham Mines	Boston	9	9	9	Sept. '19, Q	.25
Calumet & Ariz.	Boston	57	54⅝	56	Sept. '20, Q	1.00
Calumet & Hecla	Boston	284	275	284	June '20, Q	5.00
Canada Copper	N. Y. Curb.	⅛	1/16	⅛		
Centennial	Boston	9⅛	9⅛	9⅛	Dec. '18, SA	1.00
Cerro de Pasco	N. Y.	41⅛	38	39⅛	Sept. '20, Q	1.00
Chief Consol.	Boston Curb	3⅛	3⅛	3⅛	Feb. '20, Q	.10
Chile Copper	N. Y.	14⅛	14⅛	14⅛		
Chino	N. Y.	27⅛	26	26⅛	Sept '20, Q	.37½
Columbus Rexall	Salt Lake	*37⅛	*37	*37⅛		
Con. Ariz.	N. Y. Curb.	...	...	¼	Dec. '18, Q	.05
Con. Copper M.	N. Y. Curb.	...	...	2⅛		
Copper Range	Boston	35⅛	34	34⅛	Sept. '20, Q	.50
Crystal Copper	Boston Curb	*40	*30	*37		
Davis-Daly	Boston	8¼	7⅞	7⅞	Mar. '20, Q	.25
East Butte	Boston	10⅛	10⅛	10⅛	Dec. '19, A	.50
First Nat'l	Boston Curb	*80	*73	*80	Feb. '19, SA	.15
Franklin	Boston	2⅛	2⅛	2⅛		
Gadsden Copper	N. Y. Curb.	...	...	*70		
Granby Consol.	N. Y.	...	...	35⅞	May '19, Q	1.25
Greene Cananea	N. Y.	28	27⅛	27⅛	Aug. '20, Q	.50
Hancock	Boston	...	...	4⅛		
Houghton	Boston Curb	...	...	*40		
Howe Sound	N. Y. Curb.	3⅛	2⅞	3	July '20, Q	.05
Inspiration Con.	N. Y.	46⅛	44⅛	45⅛	July '20, Q	1.00
Iron Cap	Boston Curb	8¼	8	8	Sept. '20, K	.25
Isle Royale	Boston	26⅛	25	25	Sept. '19, SA	.50
Kennecott	N. Y.	24⅛	22⅞	23⅛	Sept. '20, Q	.50
Keweenaw	Boston	...	...	1⅛		
Lake Copper	Boston	3⅛	2⅛	2⅛		
La Salle	Boston	2⅛	2⅛	2⅛		
Magma Chief	N. Y. Curb.	...	...	*21		
Magma Copper	N. Y. Curb.	...	...	17	Jan. '19, Q	.50
Majestic	Boston Curb	*12	*12	*12		
Mason Valley	Boston	1⅜	1⅛	1⅜		
Mass. Con.	Boston	3¼	3¼	3¼	Nov. '17, Q	1.00
Mayflower-O.C.	Boston	5⅛	5⅛	5⅛		
Miami	N. Y.	19⅛	19	19⅛	Aug. '20, Q	.50
Michigan	Boston	4	3⅛	4		
Mohawk	Boston	58⅛	57⅛	57⅛	Aug '20, Q	1.50
Mother Lode (new)	N. Y. Curb.	5⅛	5⅛	5⅛		
Nevada Con.	N. Y.	11⅜	11⅜	11⅜	Sept.'20, Q	.25
New Arcadian	Boston	...	...	2⅛		
New Baltic	Boston Curb	...	...	3		
New Cornelia	Boston	19	17	18	Aug. '20,	.25
Nixon Nev.	N. Y. Curb.	...	...	*9		
North Butte	Boston	15	14⅛	14⅛	Oct. '18, Q	.25
North Lake	Boston	...	...	⅛		
Ohio Copper	N. Y. Curb.	...	...	1/16		
Oilbway	Boston	...	...	1⅛		
Old Dominion	Boston	24⅛	23	23⅛	Dec. '18, Q	1.00
Osceola	Boston	37	35	35	June '20, Q	.50
Phelps Dodge	Open Mar.	†200	†175	...	July '20, Q	2.50
Quincy	Boston	47	45	47	Sept. '20, Q	1.00
Ray Con.	N. Y.	15	14⅛	14⅛	June '20, Q	.25
Ray Hercules	Boston Curb	*50	*50	*50		
St. Mary's M. L.	Boston	37	36	36	June '20, K	2.00
Seneca	Boston	15⅛	15	15⅛		
Shannon	Boston	1⅛	1	1⅛	Nov. '17, Q	.25
Shattuck Ariz.	N. Y.	9	8⅛	8⅛	Jan. '20 Q	.25
South Lake	Boston	...	...	2		
South Utah	Boston	*15	*15	*15		
Superior	Boston	4⅛	4⅛	4⅛	Apr. '17,	1.00
Superior & Boston	Boston	3½	3¼	3¼		
Tenn. C. & C.	N. Y.	9⅛	9⅛	9⅛	May '18, I	1.00
Tuolumne	Boston	*50	*50	*50	May '13,	.10
United Verde Ex.	Boston Curb	31	30⅛	31	Aug. '20, Q	.50
Utah Con.	Boston	7	6⅛	6⅛	Sept. '18,	.25
Utah Copper	N. Y.	61⅛	60	61⅛	Sept. '20, Q	1.50
Utah M. & T.	Boston	1⅛	1⅛	1⅛	Dec. '17,	.30
Victoria	Boston	1⅜	1⅜	1⅜		
Winona	Boston	...	...	*35		
Wolverine	Boston	13	13	13	Jan. '20, Q	.50
LEAD						
Hecla	N. Y. Curb.	4⅛	4 1/16	4⅛	Sept '20, QX	.15
St. Joseph Lead	N. Y.	15⅛	14⅛	14⅛	Sept '20, QX	.50
Stewart	Boston Curb	...	...	*13	Dec. '15,	.05
Utah Apex	Boston	2	1⅛	2	Nov. '18,	.25
ZINC						
Am. Z. L. & S.	N. Y.	12	11⅛	11⅛	May '17,	1.00
Am. Z. L. & S. pf.	N. Y.	...	...	46⅛	Aug. '20, Q	1.50
Butte C. & Z.	N. Y.	7⅛	7	7	June 18, I	.50
Butte & Superior	N. Y.	19⅛	17⅛	19⅛	Sept. '17,	1.25
Con. Interst. Cal.	N. Y.	9⅛	9	9⅛	June '20, Q	.50
New Jersey Z.	N. Y. Curb.	178⅛	178	178	Aug. '20, Q	4 00
Success	N. Y. Curb.	*5	*4	*4	July '16,	.03
Yellow Pine	Los Angeles	‡ ..	...	*95	June '20, Q	.03

Stock	Exch.	High	Low	Last	Last Div.	
GOLD						
Alaska Gold	N. Y.	1⅛	1⅛	1⅛		
Alaska Juneau	N. Y.	2⅛	1⅛	2⅛		
Carson Hill	N. Y. Curb.	24⅛	24⅛	24⅛		
Cresson Consol. G.	N. Y. Curb.	1	⅛	1	June '20, Q	.10
Dome Ex.	Toronto	*49	*39	*39		
Dome Mines	N. Y.	11⅛	10⅛	11⅛	July '20, Q	.25
Golden Cycle	Colo. Sprgs.	‡ ...	...	*73	Sept. '20, Q	.02
Goldfield Con.	N. Y. Curb.	*9	*8	*8	Dec. '19,	.05
Hedley	Boston	...	...	4⅛	June '19,	.10
Hollinger Con.	Toronto	5.80	5.70	5.72	Sept. '20, X	.05
Homestake	N. Y.	...	...	46	Sept. '19,	.50
Kirkland Lake	Toronto	*50	*49⅛	*49⅛		
Lake Shore	Toronto	1.17	1.10	1.11	Oct. '19,	.02½
McIntyre-Porcupine	Toronto	2.07	2.00	2.06	Sept. '20, K	.05
Porcupine Crown	Toronto	*27½	*26	*27½	July '17,	.03
Portland	Colo. Sprgs.	‡ ...	...	*60	July '20, Q	.01½
Reorgan. Booth	N. Y. Curb.	6	4½	5	May '19,	.05
Silver Pick	N. Y. Curb.	*6	*4	*5		
Teck Hughes	Toronto	*9	*8½	*9		
Tom Reed	Los Angeles	‡ ...	...	*98	Dec. '19,	.02
United Eastern	N. Y. Curb.	3¼	2	3	Apr. '20, Q	.21
Vindicator Consol.	Colo. Sprgs.	‡ ...	...	*18	Jan. '20, Q	.01
West Dome Consol.	Toronto	*7½	*7	*7		
White Caps Min.	N. Y. Curb.	*10	*8	*8½		
Yukon Gold	Boston Curb	...	...	1⅛	June '18,	.02½
SILVER						
Arizona Silver	Boston Curb	*27	*18	*25	Apr. '20, M	.03
Beaver Con.	Toronto	*42½	*40	*40	May '20, K	.03
Coniagas	Toronto	...	...	2.55	Aug. '20, Q	.12½
Crown Reserve	Toronto	*29	*27	*27	Jan. '17,	.05
Kerr Lake	Boston	3⅜	3⅛	3⅛	Sept. '19,	1.00
La Rose	Toronto	*34	*34	*34	Apr. '18,	.02
McKinley-Dar.	Toronto	*57	*57	*57	July '20, Q	.03
Mining Corp.	Toronto	1.75	1.65	1.65	Sept. '20, Q	.12½
Nipissing	N. Y. Curb.	9⅛	8⅛	9	July '20, Q	.25
Ontario Silver	N. Y.	5⅛	5⅛	5⅛	Jan. '19, Q	.50
Ophir Silver	N. Y. Curb.	⅛	⅛	⅛	Jan. '12,	.10
Peterson Lake	Toronto	*16½	*14	*14⅛	Jan. '17,	.01½
Temiskaming	Toronto	*36½	*35⅛	*35⅛	Jan. '20, K	.04
Trethewey	Toronto	*29½	*26	*26½	Jan. '19,	.05
GOLD AND SILVER						
Atlanta	N. Y. Curb.	*2	*1⅛	*1⅛		
Barnes-King	Butte	‡ ...	....	1.11	Aug. '20, Q	.05
Bost. & Mont.	Boston	....	....	*63		
Cashboy	N. Y. Curb.	*8⅛	*7	*8		
El Salvador	N. Y. Curb.	1	⅛	⅛		
Jim Butler	N. Y. Curb.	*16	*14	*16	Aug. '18, SA	.07
Jumbo Extension	N. Y. Curb.	*9	*5	*7	June '16,	.05
Louisiana Con.	N. Y. Curb.	⅛	1/16	1/16		
MacNamara M.	N. Y. Curb.	...	...	⅛	May '10,	.02½
N.Y. Hond. Rosar	Open Mar.	†13	†11	...	July '20, QX	.50
Tonopah-Belmont	N. Y. Curb.	1⅛	1⅛	1⅛	Jan. '20, Q	.05
Tonopah-Divide	N. Y. Curb.	1⅛	1⅛	1⅛		
Tonopah Ex.	N. Y. Curb.	1⅛	1⅛	1 1/16	July '20, Q	.05
Tonopah Mining	N. Y. Curb.	1⅛	1⅛	1⅛	Oct. '19, SA	.15
West End Con.	N. Y. Curb.	1 1/16	1⅛	1⅛	Dec. '19 SA	.05
SILVER-LEAD						
Caledonia	N. Y. Curb.	*20	*16	*17	July, '20, M	.01
Consol. M. & S.	Montreal	25	24	25	July '20, Q	.62½
Daly Mining	Salt Lake	...	...	2.40	July '20, Q	.10
Daly-West	Boston	4⅛	4⅛	4⅛	Sept. '20, Q	.25
Eagle & Blue Bell	Boston Curb	2 1/16	2 1/16	2 1/16	Apr. '20, Q	.10
Electric Point	Spokane	*20	*18	*18	May '20, SA	.03
Fed. M. & S.	N. Y.	...	...	12	Jan. '09,	1.50
Fed. M. & S. pf.	N. Y.	32⅛	31	31	Sept. '20, Q	1.75
Florence Silver	Spokane	*30	*25	*25	Apr. '19,	.01½
Grand Central	Salt Lake	...	...	*37½	June '20, K	03
Iron Blossom	N. Y. Curb.	¼	¼	¼	Apr. '20, Q	.02½
Judge M. & S.	Salt Lake	...	...	3.97½	Sept. '20, Q	.12½
Marsh Mines	N. Y. Curb.	*17	*14	*17		
Prince Consol.	N. Y. Curb.	⅜	1/16	⅜	Nov. '17,	.02½
Rambler-Cariboo	Spokane	*9	*9	*9	Feb. '19,	.01
Rex Con.	N. Y. Curb.	*6½	*6	*6		
South Hecla	Salt Lake	*90	*89	*90	Sept. '19, K	.15
Stand. S. L.	N. Y. Curb.	¼	¼	¼	Oct. '17,	05
Tamarack-Custer	Spokane	2.30	2.25	2.30	Dec. '19, K	.03
Tintic Standard	Salt Lake	3.05	2.90	3.00	June '20, Q	.10
Wilbert	N. Y. Curb.	*5½	*4	*4	Nov. '17,	.01
NICKEL-COPPER						
Internat'l Nickel	N. Y.	18⅛	17	18	Mar. '19,	.50
Internat'l Nick.pf.	N. Y.	...	...	80⅛	Aug. '20, Q	1.50
QUICKSILVER						
New Idria	Boston	....	....	5	Jan. '19,	.25
TUNGSTEN						
Mojave Tungsten	Boston Curb	...	...	*10		
VANADIUM						
Vanadium Corp.	N. Y.	68⅛	64	65⅛	July '20, Q	1.50
ASBESTOS						
Asbestos Corp.	Montreal	98	93	94	July '20, Q	1.50
Asbestos Corp. pf.	Montreal	105	101	101	July '20, Q	1.75
MINING, SMELTING AND REFINING						
Am. S. & R.	N. Y.	61	57⅛	60⅛	Sept. '20, Q	1.00
Am. S. & R.pf.	N. Y.	90	89⅛	90	Sept. '20, Q	1.75
Am. Sm. pf.A	N. Y.	...	...	74⅛	July '20, Q	1.50
U. S. Sm. R. & M.	N. Y.	56	54⅛	54⅛	July '20, Q	1.50
U.S.S.R.& M. pf.	Boston	44	43	44	July '20, Q	.87½

*Cents per share. †Bid or asked. ‡Quotations missing. Q. Quarterly.
SA, Semi-annually. BM, bimonthly. K, Irregular. I. Initial. X, includes extra

INDUSTRIAL NEWS

Chemical Industries Exhibit Manifold Accomplishments

The Sixth National Exposition at New York Drew Many Visitors—Some Exhibits Noticed

The chemical industries of the United States and Canada held their most extensive and pretentious exposition in the Grand Central Palace, Lexington Ave. and 46th St., New York City, during the week ended Sept. 25, 1920. The more than 750 booths fully occupied the four floors of the great building, and every booth carried an attractive, interesting display, with its message of one or more successful American applications of chemical science to industrial needs. Every afternoon and evening of the week brought a steady stream of visitors, including the public, teachers, students, and industrialists, representing most of the nations of the globe. Exposition officials estimate the total attendance at 125,000, and every visitor found something worth his attention. The talks and illustrated lectures, but more especially the cinematograph demonstrations of actual plants in operation, drew crowds far exceeding the capacities of the space allotted. Future shows must follow suit.

In the following paragraphs brief note is made of some of the exhibits having special interest for the mining, metallurgical, and allied industries.

William Ainsworth & Sons—This well-established firm of instrument makers exhibited a group of assayer's balances, all of which had varying degrees of sensitiveness and corresponded to their standard grade of balance. There was also shown a compact theodolite with solar attachment.

American Metal Co., Ltd.—This mining company's chief exhibit was a group of raw and finished metallic products, such as zinc ore and zinc slabs, entering into their manifold mining and smelting activities. Manufactured and commercial forms of copper were also shown, and the variety of chemicals made from copper and other ores was illustrated.

Anaconda Copper Mining Co.—A diversified exhibit was presented by this company, and served to indicate the many fields of endeavor included in its operations. Copper, zinc, and lead commercial forms were shown, as well as many rarer metallic and chemical products. Not the least interesting feature of the exhibit was the $11,660 bar of gold (a metal rarely seen nowadays), inclosed in a glass case. The Anaconda Lead Products Co. and the Anaconda rolling Mill Department, allied and subsidiary organizations, joined in the display.

Eagle Picher Lead Co.—As this company's chief product is paint or paint pigment, its exhibit comprised many colored samples of lead pigments contained in an artistic arrangement in glass bottles.

International Nickel Co. — Monel metal, an industrial alloy of nickel, was displayed in many manufactured forms. Nickel chemicals and commercial forms of nickel also received much attention and combined to make an instructive exhibit of the nickel industry.

Lunkenheimer Co. showed a large line of valves and brass specialties of use to the chemical engineering trade which although by no means a complete line of its products, served to indicate the field covered by its activities.

Raymond Bros. Impact Pulverizer Co.—Several well-constructed models of pulverizing machinery were exhibited. One model illustrated the method used by the company to pulverize coal for use in reverberatory furnaces and another showed how a similar apparatus could be used for grinding and separating soft non-metallic minerals such as talc.

Western Electric and Manufacturing Co.—A few switchboards and motor generator sets were the chief display of this company. To have exhibited everything manufactured for use in chemical work would have necessitated much more space than was available.

Worthington Pump & Machinery Corporation—The several lines of centrifugal and direct acting pumps made by this company were given prominence, and various models exhibited.

De Laval Separator Co.—This company, of pastoral origin, demonstrated the great efficiency of its special machines for separating, or reclaiming and purifying all kinds of oil combinations, as its display of tubes of oils made clear. The separator at work was sorting machine oil out of colored water, and of course held the attention of many who are fascinated by these canny devices.

Lead Lined Iron Pipe Co.—It is difficult to make a lively display of such deadly heavy objects as lead-lined pipes, joints, and elbows. This company did as well as could be expected with its complete line of fittings.

Sullivan Machinery Co.—Air lifts, by their nature, are lively devices. This company's display of an air lift of two stages, at work, took advantage of this fact and the transparency of glass to catch everyone's attention and interest. The whirr of the compressor motors and the rush of bubbling waters was most interesting.

Magnesia Association of America.—When fire and heat are under control man needs the insulating coverings provided by this company to maintain his supremacy and direct the chained giant's efforts. This company's display of snowy, high-grade magnesia insulation was capped by a block of 85 per cent magnesia compound.

Mine Safety Appliance Co.—Walking in safety, if not comfort, through the great building, it was hard to realize the conditions of work that sometimes require the use of the complete Gibbs apparatus displayed here. The glistening collection of various pieces of gas-testing apparatus and the multi-colored canisters of absorbents for the Burrell mask seemed particularly to interest those who had experienced gas attacks in the Great War.

Chapman Valve Manufacturing Co.—This firm displayed a very complete line of bronze and iron valves tastefully arranged on either flank of and pointing to a great handsome bronze 28-in. gate valve. The design and general appearance of this centerpiece made it a fitting salesman for the valve builders.

Thwing Instrument Co.—The "hump" method, and particularly the decalescent recording device, were admirably demonstrated by this company's exhibit, where both were shown actually at work. The festoons of graphic records and the glowing little furnaces, with their thermocouples, always caught the eye.

Titanium Pigment Co. — Outdoor weather and indoor factory or mine atmospheres are all inveterate enemies of iron, steel, and wood structures, and the comparative panels displayed by this company seem to show that their "Titanox" paint is a splendid defense against them. Both by weight and by volume this coating shows a superior hiding power. The display of the usefulness of the company's products was heightened by an exhibit of attractive tiles decorated with its terra-cotta titanium pigments.

Herold China & Pottery Co.—The perfection attained by some American makers of chemical and scientific porcelain wares was well illustrated here in a display of carefully made forms ranging from the simplest pestles to complicated and delicate patterns of all sizes.

Magnetic Manufacturing Co.—The uncanny intelligence displayed by electromagnetic machinery is always interesting, and the selective action of this company's ingenious rotating disk, as shown by the half-size working model, attracted much attention when it was in action.

Midwest Engine Co.—The problem of conveying and pumping acids and other corrosives seems to have been solved in an economical way for the rotary pumps made by this company. Certainly they stood up well in contrast with the comparison test pieces displayed beside them.

Becker Christian, Inc.—A line of highly finished analytical balances of various sizes in glass cases is always an attractive showing. In this company's display contrasts were made use of by placing a man-high bullion balance of fine workmanship in the midst of its smallest relatives. A 1-kgm. weight, accompanied by U. S. Bureau of Standards certificate showing it to have no error, emphasized the quality of this firm's work.

The New Jersey Zinc Co. displayed its zinc products and many manufactures of zinc for making which the possibility of using zinc is not generally known. A section of roof covered with zinc shingles, together with leaders and gutters of zinc, caught the attention of the discriminating, though the casual visitor was possibly more attracted by the zinc meter cases, coins, bread trays, lighting fixtures, and the like.

Nichols Copper Co. took advantage of the blue, green and red of its products of copper and nickel sulphates and copper oxide to arrange a striking and artistic exhibit. Pyramids of these colors flanked on each side a larger pyramid made of successive lavers of copper ore, concentrates, matte, blister, and metal. Specimen ingot, wire, and wedge bars and other shapes of refined copper were shown.

The W. S. Tyler & Co. of Cleveland, Ohio, made its presence known over a wide area, from time to time, through the agency of one of its 6-ft. "Hummer" electro-magnetic vibrating screens, which is some hummer when working at its maximum vibration. The familiar displays of woven-wire screen, double-crimped wire cloth, and other products were also shown.

The Refinite Co., of Ardmore, S. D., demonstrated the manner in which it can soften any kind of water with its product, a zeolite mined and prepared in South Dakota. Filters for domestic and commercial use, made by the company, were also displayed, as well as some Phoenix hosiery which is "processed' in Refinite water.

Dings Magnetic Separator Co. attracted the passer by, who usually stopped to test his strength against that of the magnetic pulley which held several monkey wrenches fast against its face. A Rowand-Wetherell E No. 1 X high-intensity separator was also shown, also a type M magnetic separator.

Cleveland-Cliffs Iron Co. was present in its capacity as a manufacturer of wood chemicals. It displayed samples of alchohol (methyl), acetate of lime, and other products, including sulphuric acid. Its factories for making these are at Marquette and Gladstone, Mich., and at Goodman, Wis.

United Lead Co., N. Y., and Georgia Lead Works—The protective lining of pipes, elbows, junctions, and valves, with a heavy lead sheath impervious to corroding fluids, was well illustrated by the many forms of construction displayed by this company.

Nash Engineering Co.—The small-sectioned working model of the "Hytor," a combined air compressor and vacuum and water pump, was an interesting demonstration of the principles of this compact and efficient device. The small volume of the 300 cu.ft. per min. pattern displayed attracted some attention by its compact efficiency.

Allis-Chalmers Manufacturing Co.—The "snapping" bags of this company's dust collector and spray drier usually attracted the attention of the passerby, and the sound of dashing water in the working "Air Conditioner" drew one to a grating whence poured forth a stream of cool, moistened air. Both devices suggested the comment that out-door weather is in the hands of Providence, but indoors Man may largely be the controlling factor.

The Lungmotor Co.—The well-polished aluminum twin cylinders of the Lungmotor hand pump attracted everyone's interest. This portable and simply safeguarded device for rescuing persons overcome by gas or drowning presents many advantages in manipulation.

Foamite Firefoam Co.—The terrors of fire uncontrolled, as shown by lurid pictures and constantly changing stereopticon views, drew everyone's attention to the booth of this company. The sizzling reaction at the table where actual demonstrations of "foamite" were given kept the aisle crowded.

America La France Engine Co.—A bright array of warning and guiding metal placards covered the walls back of the interesting display of the fire-fighter's aids. Various styles of fire-fighting masks, clothing, and fire extinguishers attracted the interest and attention that these devices always receive.

General Chemical Co.—An attractive feature of this exhibit to mining men, was the diminutive Herreshoff roasting furnace. This was an iron model standing about 7 ft. high, opened and illuminated for inspection. Although not heated, the furnace was in operation, and complete even to the small blower, Herreshoff furnaces have been successfully used at many smelters, notably that of the Calumet & Arizona at Douglas, Ariz.

Groch Centrifugal Flotation, Ltd.—Many were disappointed at not having the opportunity to see this successful Canadian machine. The shipment was delayed in transit.

Hardinge Co.—The Hardinge mill is so well known that an exhibit would seem almost superfluous. The principle of operation was well shown in a small glass model filled with nuts of assorted sizes. A larger iron model about five feet long was also revolving merrily.

Huff Electrostatic Separator Co.—The principle of operation of this company's separator was well shown in an open model about six feet high. The snapping discharge attracted considerable attention.

The Merrill Co.—This exhibit of the Merrill Co. was confined principally to the equipment designed by this firm. Of special interest of course was the new Merco Nordstrom plug valve, of which it can be truly said that "it can't stick and it won't leak." Whether cyanide solutions, lime emulsions or scale-forming fluids are to be handled, the Merrill engineers seem to have solved the valve question.

The Mine & Smelter Supply Co.—An exhibit in motion is always attractive and a laboratory flotation machine built of glass is particularly adaptable for show purposes. The model of the Ruth machine shown attracted wide interest. The small Wilfley table was also a feature and even experienced millmen liked to watch the shower of black concentrates coming off the end.

Oliver Continuous Filter Co.—The Oliver filter is adapted to exhibition purposes as well as to mill operation, particularly when a nice white filter cake can be provided. The model in operation was of about 3-ft. size and gave an excellent exemplification of the way these standard machines work in practice.

Stimpson Equipment Co.—No one who reached the third floor could help but investigate the Stimpson exhibit, so alluring was the whirr of the new, electrically vibrated Mitchell screen. This new type promises to revolutionize mill screening in the finer sizes. That the vibration was there, many were willing to get greasy hands to find out.

Corning Glass Works—This company is one of the leading exponents of the manufacture of American laboratory glass ware. An unusually complete line of standard and intricate forms was exhibited. It was a happy thought to include a demonstration of glass bending, blowing, and sealing. When the operator faced his roaring blowpipe flame, a crowd of fascinated boys and men soon gathered there.

The Dorr Co.—Working models of the Dorr thickener, Dorrco pump, and Dorr agitator were of sufficient size to attract considerable attention. Other exhibits showed that this company does not confine its activities to mining, a working model of a system of sewage purification being a feature.

Foote Mineral Co.—The rare minerals are always interesting. Both crude and refined products were shown in an attractive display.

United Filters Corporation—The disk type of filter is still of sufficiently recent introduction to be critically inspected by mining men. The working models shown plainly exhibited how simply the filter segments could be changed and the large capacity considering the size of the machine.

American Metric Association—At an exposition of chemical industries, a booth devoted to the advantages of the metric system of weights and measures, seems a superfluity, as the pure and the applied science underlying the whole exposition uses that system almost exclusively. A representative was on hand, however, and presided over a display of familiar canned food containers whose weights were given in ounces and in grams on their labels. Two sheets of the International Map, scale 1:1,000,000, published by the United States, also displayed the advantages of the metric scale.